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TOMLINSON (J. A.). **Crook-root disease of Watercress.**—*N.A.A.S. quart. Rev.*, **49**, pp. 13–19, 2 pl., 1960. [9 ref.]

A review of *Spongospora subterranea* f. sp. *nasturtii* on watercress and its control [**38**, 286, 637; **40**, 136].

NOLL (A.). **Untersuchungen zur Frage des Vorkommens von physiologischen Rassen bei Cercospora beticola.** [Investigations of the occurrence of physiologic races of *C. beticola*.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 7, pp. 102–104, 1 graph, 1 map, 1960. [Engl. summ.]

At Inst. für Botanik, Brunswick, examination by Koch's method [**37**, 257; **38**, 46] of single spore lines of *C. beticola*, obtained from beet from various regions of W. Germany in 1955–59, indicated the probable existence of physiologic races. In view of the variability of the fungus in culture [**39**, 519] it is suggested that future tests on race determination and on sugar beet resistance be conducted with conidia gathered from infected beet plants.

KOCH (F.), VETTER (A.), & VÖLKER (W.). **Ergebnisse einer weiteren vierjährigen Serie von Sorten-Spritzversuchen mit Zuckerrüben im Cercospora-Befallsgebiet von Niederbayern/Oberpfalz.** [Results of a further 4-year series of varietal spraying experiments with Sugar Beets in the *C.*-infected area of Lower Bavaria/Upper Palatinate.]—*Zucker*, **13**, 20, pp. 506–514, 1960. [Engl., Fr. summ.]

The appreciable reduction in the incidence of leaf spot (*C.* [*beticola*]) shown by the results of a further series of trials on 6 vars. during 1956–59 [cf. **36**, 443] with cupravit at 4 kg./ha. is attributed in the 1st place to the steady decrease in the infection potential consequent on a systematic spraying campaign and intensified plant hygiene, and only in a lesser degree to climatic changes. Although a considerable increase in the productivity of the resistant vars., e.g. V–W–Cercopoly, has been achieved, their performance cannot yet compare with that of the high-yielding polyploid types after treatment. For the time being, therefore, the resistant vars. should be cultivated in the infected area only on farms where a large leaf crop is important and a regular spraying programme impracticable.

SCHROEDER (W. T.), PROVVIDENTI (R.), BARTON (D. W.), & MISHANEC (W.). **Temperature effecting a reversal of dominance in the resistance of Pisum sativum to Bean virus 2.**—Abs. in *Phytopathology*, **50**, 9, p. 654, 1960.

Deviations from the expected 3:1 ratio in F_2 pea progenies with respect to resistance to bean virus 2 [bean yellow mosaic virus: **39**, 362], which is controlled by a single recessive gene, are due to the effect of temp. on symptom expression. At air temps. of 65° F. or below phenotypic resistance in F_2 progenies is dominant, at 80° or above, recessive, and between these temps. symptoms are delayed. This effect is confined to heterozygotes.

SCHROEDER (W. T.), PROVVIDENTI (R.), & MCEWEN (F. L.). **An unusual virus isolated from Pisum sativum affected by streak.**—Abs. in *Phytopathology*, **50**, 9, p. 654, 1960.

A virus isolated in 1954 from streaked pea plants at Geneva, N.Y. [cf. **38**, 172; **39**, 362], caused wilting and death of young peas inoculated in the greenhouse at 70° F.

At lower temps. plants developed a mottle and then tip necrosis. The virus was

recovered from 42 of 80 plant spp. inoculated mechanically, symptoms varying from local lesions to systemic mottle, ringspot, and terminal bud necrosis. The virus is non-persistent, is readily transmitted to pea by *Myzus persicae*, and is transmitted mechanically from spinach to spinach, but not from spinach to pea or to *Nicotiana glutinosa*.

Brewer (D.). **Studies in Ascochyta pisi Lib.**—*Canad. J. Bot.*, **38**, 5, pp. 705–717, 1960.

In studies at Univ. Toronto, Ont., it was shown that the immunity of the pea var. A–100 from *A. pisi* [**33**, 650] is due to the physical barrier of the cuticle, while the resistance of O.A.C. 181 is physiological. Infection took place from 45–80° F.; at lower temps. symptom expression was delayed and the number and size of the lesions increased. In culture [**39**, 155] the pathogen utilized nitrate, ammonium, amide, and amino N, and a wide var. of C sources, though various isolates differed in their ability to use these last. Initiation of sporulation is dependent upon the exhaustion of the C supply and the pH.

Wilding (M. D.). **A study of the free amino acids in Alfalfa and Red Clover roots as related to winterhardiness and the occurrence of hydroxylysine and hydroxyaspartic acid in Alfalfa roots. Biochemical studies on resistance in Peas to Fusarium oxysporum.**—*Diss. Abstr.*, **21**, 1, pp. 45–46, 1960.

At Univ. Wis. culture filtrates of *Fusarium oxysporum* f. *pisi* race 2 (near wilt) [cf. **38**, 652; **39**, 450] from a susceptible pea var. exhibited 3 times the pectin methyl esterase activity of culture filtrates from the same str. grown on a resistant var. An inhibitor of the near wilt fungus was extracted from resistant but not from susceptible plants. Furthermore, the peroxidase and polyphenoloxidase activity of filtrates from resistant pea tissue was 3 times that of filtrates from susceptible tissue, and the resistant filtrates were more inhibitory to pectic enzyme activity.

An intense browning occurred in intact resistant plants close to the site of fungal penetration into the roots, to which it was limited, in contrast to the browning of the entire vascular system of susceptible ones. Experimental results suggested that when the fungus penetrates a resistant plant it stimulates high oxidative activity with generation of toxic products suppressing the hydrolytic enzyme systems of the fungus. This may permit the resistant plant to repair its cells faster than the fungus breaks them down.

Yarwood (C. E.). **Uredospore production by Uromyces phaseoli.**—Abs. in *Phytopathology*, **50**, 9, p. 659, 1960.

Uredospores of *U. phaseoli* [*U. appendiculatus*] matured 7–8 days after inoculation of greenhouse-grown Pinto beans [*Phaseolus vulgaris*: **38**, 572]. The number of spores produced/pustule/day rose from 400 8 days after inoculation to 70,000 at 21 days with 0·01–0·2 pustules/sq. cm. leaf area. Leaves with 200 pustules/sq. cm. were killed in about 10 days, and with 4 pustules/sq. cm in 55 days. The total spore production was 1,000,000/sq. cm. during the life of leaves for a wide range of infection dosages. The generation time for doubling the population is estimated at 0·8 days.

Mastenbroek (C.). **A breeding programme for resistance to anthracnose in dry shell Haricot Beans, based on a new gene.**—*Euphytica*, **9**, 2, pp. 177–184, 1 pl., 1960. [Dutch summ.]

At the Plant Breeding Sta., Hoofddorp, Netherlands, a hitherto unknown, dominant gene *Are* for resistance to *Colletotrichum lindemuthianum* [**39**, 653] has been found in Cornell 49–242 [**35**, 572], a black bean [*Phaseolus vulgaris*] from Venezuela. This gene has been used as a basis for a breeding programme of brown, dry shell

beans and has been incorporated by backcrossing strains resistant to halo blight [*Pseudomonas medicaginis*: loc. cit.]. Observed segregations may be explained by assuming the presence of 1 dominant gene, governing resistance to all races of all 4 race-groups (α, β, γ, δ) of the fungus. Undesirable linkages have not been encountered.

STUBBS (L. L.). **Aphid transmission of Broad Bean wilt virus and comparative transmission efficiency of three vector species.**—*Aust. J. agric. Res.*, **2**, 5, pp. 734–741, 1960.

In transmission tests at Dept Agric., Burnley, Victoria, *Myzus persicae* fed on a low-conc. source infected 27 of 110 broad bean plants with wilt virus [**37**, 134] while *Aphis craccivora* failed to infect any. After high-conc. virus source feeding the infection rate for *M. persicae* was 3 times that for either *A. craccivora* or *Macrosiphum euphorbiae*. *Myzus persicae* transmitted the virus after 24 hr. on a high conc. virus source plant, but the virus was not retained after a further 24 hr. on healthy plants. Broad bean wilt virus is apparently unrelated to any of the other viruses affecting this host.

KSIĄŻEK (D.). **Doświadczenia nad przenoszeniem się wirusów żółtej karłowatości (Allium virus 1 Melhus) i żółtaczki Astrowej (Callistephus virus 1 A, Smith) na niektóre gatunki Allium przez inokulacje sokiem.** [Experiments on the transmission of yellow dwarf (*A.* virus 1) and Aster yellows (*C.* virus 1 A) viruses to some *A.* spp. by sap inoculation.]—*Acta agrobot.*, **9**, 2, pp. 75–87, 5 fig., 1960. [Engl. summ. 13 ref.]

At Inst. Ecology, Polish Acad. Sci., Warsaw, onion yellow dwarf virus [map 46] obtained from onion plants grown from seeds and setts was transferred by sap inoculation to ca. 38% of the onion plants inoculated and of the shallot. These were used as sources of inoculum, each for 10 test plants. That from onion and shallot infected, respectively, 6 and 10 shallot plants, 3 and 8 Wolska onion from setts, 3 and 7 onion from seeds, and 3 and 5 *Narcissus tazetta* var. Red Guard, but not leek, *A. fistulosum*, chives, or *N. jonquilla*. A virus from onion grown from seed, suspected to be aster yellows [map 56], could not be sap transmitted.

VENKATARAYAN (S. V.). **Onion smut in Mysore.**—*Curr. Sci.*, **29**, 8, p. 324, 1960.

The recent report of *Urocystis cepulae* on onion in Mysore [**39**, 526] is not a new record, as the fungus was collected in 1920 from the same area.

NELSON (R.). **Bacterial petiole spot of Celery.**—Abs. in *Phytopathology*, **50**, 9, p. 648, 1960.

Losses of over 10% have occurred in some fields of celery, particularly of the vars. Cornell 19 and Utah 52–70 in Mich. for several years. Watersoaked, sunken lesions near the soil line become light yellow, then deep brown, and coalesce to form areas up to 1 in. diam.; they are prominent on the inner surface of the petioles and revealed only at harvest. A bacterium isolated produced typical lesions on sprayed unwounded petioles of both vars. In commercial plants control is satisfactory with a Cu-containing protectant.

KOZHEVNIKOVA (Mme L. M.) & ONUFRIEV (A. F.). Болезни Земляной Груши. [Diseases of Jerusalem Artichoke.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 8, pp. 56–57, 1960.

This survey of diseases of Jerusalem artichoke [*Helianthus tuberosus*] from Dokuchaev's sci.-Res. Inst. Agric. Ts. Ch. P. includes white rot (*Sclerotinia libertiana*) [*S. sclerotiorum*: cf. **15**, 421], to which the hybrids 53 and 54 were most and the vars. VSKhI, Kievskiĭ belyĭ, and Belyĭ urozhaĭnyĭ least resistant; grey

rot (*Botrytis cinerea*); *Macrosporium* sp., forming brown spots on leaves and attacking particularly Belŷĭ urozhaĭnŷĭ and VSKhI; and *Alternaria* sp., invading the minute wounds left on the leaf surface by broken trichomes, especially in the hybrids 53 and 54. Checkered planting (60×60 cm.) at 1 tuber/hole, isolation of infected stands, destruction of weeds nearby, removal of diseased plants, application of herbicides towards the end of June, and crop rotation every 2–3 yr. are recommended for control.

MARRAS (F.). **Esperienze di lotta contro il 'mal bianco' del Carciofo (Leveillula taurica (Lév.) Arn. f. cynarae Jaczw.).** [Experiments on the control of mildew of Globe Artichoke (*L.t.* f. *cynarae*).]—*Notiz. Malatt. Piante* 52 (N.S. 31), pp. 23–43, 1 pl., 1 fig., 3 diag., 1 graph, 1960.

In spraying tests in Sardinia in 1957 and 1958–9 good control was given by 0·8% shirlan and even better by karathane [cf. **37**, 638] at 0·06 and 0·09%; the lower conc. is recommended. Treatment should begin as soon as the 1st spots appear and should continue (10–12 applications in all) until infection is checked by the fall in temp., which (in Sardinia) coincides with the beginning of harvesting. The increase in yield that results from the treatment fully justifies the expense.

MARRAS (F.). **Prove di lotta contro la 'ruggine' delle Indivie (Puccinia cichorii (DC.) Bell.).** [Experiments on the control of rust of Endive (*P. cichorii*).]—*Notiz. Malatt. Piante* 52 (N.S. 31), pp. 137–146, 1 pl., 2 fig., 2 graphs, 1960. [Engl. summ.]

In a field test in Sardinia complete control [cf. **36**, 371] was given by 4 spray applications of a mixture of zineb and karathane.

MOLLER (W. J.) & ROGERS (I. S.). **Spotted wilt of Lettuce.**—*J. Agric. S. Aust.*, **64**, 3, pp. 94–95, 106, 3 fig., 1960.

In the summer of 1959 [tomato] spotted wilt virus disease [map 8] cost Adelaide lettuce growers several thousands of pounds. Areas in the Hills and Plains were affected and many growers lost over half their crops within 2 weeks. This was the 1st serious outbreak of the disease on lettuce in S. Australia. The symptoms, manner of spread, and control of the disease by insecticidal spraying are briefly noted.

CHAVES (G. M.). **Occorência da forma perfeita de Sclerotinia sclerotiorum (Lib) De Bary em Minas Gerais.** [The occurrence of the perfect state of *S. sclerotiorum* in Minas Gerais.]—*Bol. fitossanit.*, **8**, 1–2, pp. 43–45, 2 fig., 1960.

A note from the Departamento de Horticultura da Escola Superior de Agricultura, Viçosa, M. Gerais, Brazil, of this occurrence on lettuce [cf. **37**, 266].

SIMMONDS (N. W.) & HARRISON (E.). **The genetics of reaction to Pepper veinbanding virus.**—*Genetics*, **44**, 6 (3) (*1959*), pp. 1281–1289, 1960.

Ford Hook (sweet), Puerto Rico Wonder, and Large Bell Hot vars. of *Capsicum annuum* and Hot Yellow (*C.* ? *sinense*) were used as parents in these studies at Imp. Coll. trop. Agric., Trinidad. Two loci controlling seedling reaction to pepper [chilli] veinbanding virus [**38**, 52] were detected: V_1, incompletely dominant, causes vein necrosis, leaf abscission, some mosaic, and death; V_2 causes mosaic, enhances the effect of V_1, and increases susceptibility; the two are not linked. The double recessive is resistant, grows well, but develops mild mosaic. The V_1 and V_2 loci are different from the L locus controlling reaction to tobacco mosaic virus [**34**, 426].

Hot Yellow is resistant to *Cercospora capsici* which causes some defoliation in the other 3 vars.

Preliminary tests indicated that *Capsicum sinense* (1725, 1774), *C. pubescens* (1789), *C. frutescens* (965, 1583), and *C. pendulum* (1244, 1762, 1786) are resistant to mosaic.

ILLMAN (W. I.). **Identity of an incitant of anthracnose in Sweet Peppers.**—*Canad. Plant Dis. Surv.*, **40**, 1, p. 45, 1960.

The author accepts *Colletotrichum coccodes* (Wallr.) Hughes [cf. **38**, 467] for *C. atramentarium*. Cultures of this fungus from field-grown sweet peppers [*Capsicum*] in Essex County, Ont., in Sept. 1959 were similar to isolates from tomato [**39**, 502] and potato and caused typical lesions on inoculated tomato fruits.

NAKAYAMA (R. M.). **Verticillium wilt and Phytophthora blight of Chile Pepper.**—*Diss. Abstr.*, **20**, 12, pp. 4484–4485, 1960.

In New Mexico the vascular tissues of *Capsicum frutescens* var. *longa* infected by *V. alboatrum* [**38**, 378] was discoloured; the pathogen was isolated from the root, stem, petiole, and fruit peduncle. *P. capsici* [**38**, 659; **40**, 198] caused a dark rot of the cortex of the main root and some of the laterals; the diseased cortex was easily pulled off in advanced stages of the rot. *P. capsici* was recovered only from the discoloured root and stem cortex and from separately infected fruit. It was pathogenic to 30-day-old squash, pumpkin, and 30- and 120-day old California Wonder capsicum plants, while *V. alboatrum* from capsicum was mildly pathogenic to cotton, but isolates from cotton, tomato, and potato were non-pathogenic to capsicum.

Zoospore germ tubes of *P. capsici* penetrated either through the stomata or directly through the epidermal cells 60–120 min. after inoculation. *V. alboatrum* was recovered from infected roots and stems after 2 yr. storage, but not from seed. *P. capsici* was isolated from seed 30 days after fruit inoculation but not from other parts of the plant after 3 months' storage.

All isolates of *P. capsici* produced the symptoms attributed to *Fusarium annuum* [**34**, 126] and also to *P. capsici*. *F.* isolates from diseased capsicums were all non-pathogenic.

MCKEEN (C. D.) & MOUNTAIN (W. B.). **Synergism between Pratylenchus penetrans (Cobb) and Verticillium alboatrum R. & B. in Eggplant wilt.**—*Canad. J. Bot.*, **38**, 5, pp. 789–794, 4 graphs, 1960. [16 ref.]

At Res. Sta., Canada Dept Agric., Harrow, Ont., it was established in steam-sterilized soil that the nematode *P. penetrans* increased infection of eggplant by low and intermediate levels of *V. alboatrum* at which levels the nematode was present in greater numbers than in the absence of the fungus, but as the fungus inoculum increased this effect disappeared. Alone, the nematode had no adverse effect on eggplants.

VAN REGENMORTEL (M. H. V.). **Serological and biophysical properties of a ringspot virus of Squash (Cucurbita pepo L.).**—*S. Afr. J. agric. Sci.*, **3**, 2, pp. 243–257, 4 pl., 1 fig., 2 graphs, 1960. [Fr. and Afrikaans summ. 19 ref.]

At Univ. Cape Town Virus Res. Unit a ringspot virus isolated from diseased squash plants in Western Cape Province was partially purified by chemical means, differential centrifugation, and gradient zone electrophoresis. An antiserum was prepared in rabbits and the gel-precipitin technique used for quantitative serological tests and the determination of the diffusion constant of the virus. The sedimentation constant was found to be 104 S, compared with 98 S determined by analytical ultracentrifugation, and the calculated particle size of 25 mμ compared well with 26 mμ obtained from electron micrographs. This squash virus appears to be a str. of cucumber mosaic virus, as recently described [**38**, 646].

Van Velsen (R.). **A strain of Melon mosaic virus on 'Cucurbita moschata Duchesne' in New Guinea.**—*Papua & N. Guinea agric. J.*, **13**, 1, pp. 36–38, 1960.

At Lowlands agric. Exp. Sta., Keravat, New Britain, a str. of melon mosaic virus [**36**, 298] was isolated from *Cucurbita moschata*. The virus had a limited host range, causing systemic infection of Cucurbitaceae, and local lesions in *Chenopodium amaranticolor*. The thermal inactivation point was 57–60° C. for 10 min., dilution end point 10^{-3}–10^{-4}, and longevity *in vitro* 72–96 hr. The virus is transmitted by sap and by *Aphis gossypii*.

Ragimov (U.). Гниль корневой шейки Тыквенных культур и меры борьбы с нею. [Collar rot of Cucurbit crops and control measures.]—Соц. сел. Хоз. Азерб. [*Sots. sel. Khoz. Azerb.*], **7**, 5, pp. 49–50, 1958.

Investigation of infected parts of cucurbits revealed mycelium and spores of *Fusarium* sp. [cf. **39**, 145, 764]. In the test fields of the exp. farm of the Azerbaijan agric. Inst. there was 34% infection of cucumber, 20% of melon, and 19% of watermelon. Development of the disease on melon and watermelon stops at the beginning of June, but continues on cucumber. Seed treatment with granosan (2–3 g./kg. seed) gave healthy plants with all 3 cucurbits. At this conc. granosan also stimulated germination vigour. Untreated plants were 9–25% infected.

Neklyudova (Mme E. T.). Болезни Кабачков. [Diseases of Pumpkins.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 8, pp. 55–56, 1960.

At Exp. Selection Sta. 'Mayak' All-Union Plant Cultivation Inst., Assinovskaya, Checheno-Ingush A.S.S.R., mass dying-off of pumpkin [*Cucurbita pepo*: cf. **37**, 623; **38**, 346] flowers, common in the fields of N. Ossetin and Checheno-Ingush, was shown to be a complex disease, the chief manifestations of which were the drying of buds, atrophy of ovaries immediately after flowering, and fruit rot. The 1st named symptom, noticed also on cucumber, melon, squash, eggplant, pepper, and tomato, was characterized by buds turning pale-green, then yellow to brown, and losing turgor, and by markedly vigorous growth of the vegetative parts of the plant. The ovaries died only in unpollinated flowers, numerous since the flowers only open in the early morning; artificial pollination ensured almost 100% healthy development, resulting in double yield. Fruit rot caused by *Pythium* sp. began as a small watery spot at the floral end and extended gradually to the base; that caused by a *Rhizopus* sp. started with darkening of the floral organs and the appearance thereon of a mycelial weft. In contrast to these bacterial rot [unspecified] attacked only skin-injured fruits. Raising bees nearby to effect pollination and spraying the young plants with 1% Bordeaux mixture every 10–15 days are recommended for control.

Deshmukh (M. J.) & Chhibber (K. N.). **Field resistance to blight (Phytophthora colocasiae Rac.) in Colocasia antiquorum, Schott.**—*Curr. Sci.*, **29**, 8, pp. 320–321, 1 fig., 1960.

At the Central Potato Res. Inst., Simla, India, the colocasia var. Ahina proved field-resistant to *P. colocasiae* [cf. **37**, 205], differing from the susceptible var. Patna Local in that only a quarter of the number of sporangia found on the latter appeared on leaf lesions on the former, which were black, indicating a weak hypersensitive reaction.

Cadman (C. H.), Dias (H. F.), & Harrison (B. D.). **Sap-transmissible viruses associated with diseases of Grape Vines in Europe and North America.**—*Nature, Lond.*, **187**, 4737, pp. 577–579, 1 fig., 1960. [17 ref.]

At the Scottish hort. Res. Inst., Invergowrie, and Rothamsted exp. Sta., isolates were obtained from leaves of the Portuguese var. Fernão Pires affected by urticado

A and B [vine infectious degeneration virus] and infectious chlorosis [**39**, 148], the French vars. Chardonnay, infected with court-noué [vine infectious degeneration virus], and Vialla, with 'panachure', the Swiss var. Chasselas, with court-noué, and the U.S.A. var. *Vitis rupestris* St. George with fanleaf A and B [vine infectious degeneration virus: **38**, 237]. These viruses were transmitted mechanically to *Chenopodium amaranticolor* [**40**, 140], White Burley tobacco, *Nicotiana clevelandii*, cucumber, and French bean (*Phaseolus vulgaris*). All the vine isolates produced chlorotic and necrotic lesions on the inoculated tobacco leaves and systemic mottling or necrotic ringspot in *N. clevelandii*; urticado A, Swiss court-noué, and fanleaf A caused systemic yellow blotching in cucumber, and chlorotic lesions and also systemic mottling on bean leaves. The symptoms in *C. amaranticolor*, which were developed 7–20 days after inoculation with vine isolates in contrast to 5–10 days with arabis mosaic virus [**40**, 143], were similar for both viruses (chlorotic lesions in the inoculated leaves and systemic symptoms which involve chlorotic vein-banding and mottling on the young leaves and later leaf deformation and total stunting). Tests with the antisera to arabis mosaic and fanleaf A indicated antigens in common. Urticado A and infectious chlorosis had similar effects on the herbaceous plants and similar properties *in vitro*, but produced different symptoms on vine, and therefore may not be strs. of the same virus, though causing some mutual interference when together. Both these viruses and fanleaf B contained many spherical particles approx. 30 mμ diam. The distribution of urticado in Portuguese vineyards coincides with that of a nematode, probably *Xiphinema index*, suggesting a relationship to fanleaf [loc. cit.].

Grünzel (H.). **Studien zur biologischen Differenzierung des falschen Mehltaues der Weinreben (Peronospora viticola de Bary).** [Studies on the biological differentiation of downy mildew of Vines (*Plasmospora viticola*).]—*Phytopath. Z.*, **39**, 2, pp. 149–194, 5 fig., 1 map, 1960. [Engl. summ. 206 ref.]

Populations of different provenance and single-spore lines of *P. viticola* [**39**, 149] from the vine-growing areas of central Europe were studied at the Inst. für Obstzüchtung, Naumburg/S., Germany, in respect of pathological, morphological and physiological differences that might justify the establishment of morphological vars. or physiologic races. Inoculations on a test collection of 60 vine spp. and cultivars revealed no differences in aggressiveness; none remained uninfected. No differences were detected in the duration of fructification under normal conditions as well as under extreme conditions of temp., nor was there any great variation in sporangial size. Size and branching of the sporangiophores proved too dependent on environment to be used as differential characters. Mode of germination of the sporangia and duration of swarming were the same in all cultures investigated.

Fungicidal preparations based on zineb, captan, phygon, phaltan, and rhodan-dinitrobenzene proved fully effective against all populations of the fungus investigated. With ziram, ferbam, thiram, and Cu oxychloride preparations there were slight differences in attack. Differences in oospore production can probably be ascribed to heterothallism as well as to the factors provided by host plant and the environment. It was also possible to demonstrate a considerable capacity for modification of the form and size of the sporangia, this too being conditioned by the different host spp.

Zachos (D. G.). **Recherches sur la biologie et l'épidémiologie du mildiou de la Vigne en Grèce. Bases de prévisions et d'avertissements.** [Researches upon the biology and epidemiology of downy mildew of the Vine in Greece. The bases of forecasts and warnings.]—*Ann. Inst. phytopath. Benaki*, N.S., **2**, 4, pp. 193–355, 1 fig., 20 graphs, 1959. [43 ref. Received Dec. 1960.]

A comprehensive account of detailed studies of *Plasmopara viticola* [cf. **32**, 361]

1950–59 to obtain data for better control of the disease and the setting up of spray warning services for the main vine-growing areas of Greece. The final sect. covers economic aspects of the disease in that country.

Mil'ko (A. A.). К вопросу о видовом составе почвенных грибов, вызывающих гниение корней Винограда, поврежденных филлоксерой. [On the specific composition of the soil fungi causing rot of Vine roots damaged by phylloxera.] Изв. Молд. Фил. Акад. Наук СССР [*Izv. Mold. Fil. Akad. Nauk S.S.S.R.*], *1959*, 8(53), pp. 55–66, 1959. [Mold., Germ. summ. Abs. in *Referat. Zh. Biol.*, *1960*, 17, p. 185, 1960.]

From soil, roots, and rhizosphere of vine (resistant Ripariya×Rupestris 101–14, medium resistant Rara nyagra, and susceptible Shasla) undamaged and damaged by phylloxera and of damaged roots after fumigation, samples were taken at budding, flowering, and ripening. Most of the 105 spp. (54 gen.) of fungi isolated were hyphomycetes. More fungi were isolated from roots infected by phylloxera than from healthy roots. Soil treatment with dichloroethane reduced the number of fungi immediately after treatment. The fungi systematically isolated from pieces of root damaged by phylloxera were *Cylindrocarpon radicicola*, *Fusarium oxysporum*, *Gliocladium verticilloides*, and *Penicillium piscarium*.

Graham (E. T.). **Apparent photosynthesis, transpiration, and growth of Concord Grape (Vitis labrusca L.) as influenced by some chemicals used in sprays.**—*Diss. Abstr.*, **21**, 1, p. 15, 1960.

From greenhouse experiments at Pa State Univ. it was concluded that reduced vigour and foliage damage in Concord grapevines sprayed with Bordeaux mixture+an oil-base spreader-sticker may be due to oil-induced metabolic disturbances, which become manifest in the reduced growth and depressed apparent photosynthesis. No injurious effects followed spraying with DDT, ferbam, or tribasic Cu sulphate+lime.

Annual Report 1959, Glasshouse Crops Research Institute.—141 pp., 4 pl., 4 graphs, 1 map, 1960.

In the Mycology sect. (pp. 59–64) [cf. **39**, 260] P. H. Williams reports that watering is not an important factor in the spread of *Didymella lycopersici* on tomato.

Olwen M. Stone demonstrated that *Erysiphe cichoracearum* from cucumber was able to overwinter on *Sonchus asper* in a cold frame and re-infect cucumbers in the spring. *Itersonilia perplexans* was unable to infect chrysanthemum under the hot, dry conditions of summer, 1959.

Marion H. Ebben showed that the carnation vars. Apollo and Clayton Crimson were the most resistant and Pink Betty Lou, Cardinal Sim, and Peterson's Sim the most susceptible to *Pectobacterium parthenii* var. *dianthicola* [cf. **38**, 389]. Of the fungi isolated from roots of polyanthus plants [*Primula polyantha*] affected by a lethal disease causing stunting and yellowing of the leaves only *Thielaviopsis basicola* caused root infection but without top symptoms. Seedlings pricked out in soil in which stunted plants had grown grew poorly.

From work on watery stipe of mushrooms Doreen G. Gandy [**40**, 70] concluded that the disorder was transmitted by inoculation with material from affected beds, though not by water extracts of these, it caused deterioration and disappearance of the mycelium with loss of crop, and was transmitted from abnormal to healthy spawn. Filtrates from affected mycelium had no effect on normal growth but there was evidence that heat treatment (33° C.) slowed the translocation of the disease in the mycelium. No bacteria were found in cultures from diseased crops and treatment with rose bengal (1/5,000–1/20,000) had no effect on these.

In the Virology sect. (pp. 65–76) M. Hollings & Olwen M. Stone note that during the indexing [**37**, 220] of carnation vars. from commercial growers carnation mottle, carnation ringspot, carnation vein mottle [**35**, 100], lucerne mosaic, and tobacco ring spot viruses were identified. Batches of *Dianthus barbatus* contained individuals which differed in their reactions to the carnation viruses, hampering its use as a test plant. Carnation ring spot is less prevalent than some years ago and may be eliminated from stocks by heat treatment or tip culture. Carnation vein mottle virus (possibly a str. of carnation mosaic virus of the U.S.A.) [**37**, 286] occurs every year in *D. barbatus* in gardens.

Two methods of obtaining virus-free plants are outlined by Olwen M. Stone. Tips ½–1 mm. long were dissected from carnation meristems, cultured in an agar medium containing inorganic nutrients, vitamins, and a growth factor, and transplanted 7 weeks after rooting; about 15% of the tips survived to form mature plants. Infection with carnation ring spot was eliminated but not carnation mottle. When rooted cuttings of Saugus White were grown for 4–6 weeks at 100° F. and the meristem tips subsequently cultured, ring spot was eliminated but not mottle.

M. Hollings states that about 10 viruses are present in stocks of English chrysanthemums [**37**, 238]. Evidence was obtained that green flower of Balcombe Perfection chrysanthemums is caused by a virus of the yellows type and is distinct from the American flower distortion virus, failing to give the diagnostic symptoms on Blazing Gold [**36**, 763]. Green flower, transmitted by *Cuscuta subinclusa* to *Vinca rosea*, caused apical rosetting, yellowing and chlorosis of the leaves, and phyllody. Following grafting from chrysanthemum to chrysanthemum the delay in symptom expression was 1–2 yr., but from *Vinca* to *Vinca* it was 3–5 weeks.

The undescribed [chrysanthemum] virus D [**38**, 747] causes symptoms similar to [tomato] aspermy [virus], but grafting may take 1–2 yr. to produce diagnostic symptoms. When chrysanthemums infected by chrysanthemum vein mottle virus [loc. cit.] + virus D were grafted on to Good News, severe flower dwarfing and distortion were produced in 6 weeks, quite distinct from the leaf mottling caused by vein mottle virus alone. Neither virus D, virus E (another flower-distorting virus), nor vein mottle, were eliminated by heat treatment. An antiserum prepared against vein mottle reacted specifically with the virus in *Nicotiana clevelandii* or petunia but not with chrysanthemum sap.

In a note (p. 104) on American stunt virus in English chrysanthemum stocks [cf. loc. cit.] M. Hollings states that this virus was more readily spread by knives and handling than English stunt isolates, though spread was reduced by dipping knives in 3% Na_3PO_4. Stunt virus causes the whole plant to be reduced in size and the flowers to open earlier. The only known means of spread is by handling plants.

L. Broadbent notes that though the presence of tobacco mosaic virus in the testas (though not in the embryos) of tomato seeds from infected fruit [cf. **40**, 187] is now accepted, none of over 1,000 seedlings grown from infected seed which was fermented for 5–7 days and then cleaned and dried contracted infection. When seedlings were inoculated with TMV in diluted tomato leaf sap, dilutions of even 1 in 5,000,000 were still sufficient to produce some infection (3 of 40). Plants developing mosaic symptoms when past the 2–3 leaf stage are probably infected from sources other than seed.

The best method of treating worker's hands after contact with infected tomatoes was dipping in 3% Na_3PO_4 [loc. cit.]. Clothing remained infective for 7 months after contact with infected leaves: the virus was inactivated on cloths by 1% Na_3PO_4 with or without detergent, but not by detergents alone.

R. Howles found that none of 5 treatments [detailed] totally eliminated tobacco mosaic virus from tomato seed and some reduced germination.

M. Hollings reports that cucumber stunt mottle disease, serious in a Cheshire nursery, is caused by a str. of arabis mosaic virus [**39**, 427 *et passim*]. The virus did

not infect any solanaceous plants until after passage through *Nicotiana clevelandii* [**39**, 465].

During the winter many pelargoniums infected by pelargonium leaf curl virus [cf. **36**, 648] developed symptoms that included yellow, star-shaped, necrotic lesions on the leaves and which eventually caused crinkling and shot-hole. The virus consistently isolated from affected plants produced local lesions in *Chenopodium amaranticolor*, bean, and *Gomphrena globosa*. Symptoms were induced by inoculating pelargoniums in autumn and winter (only) from *N. clevelandii* but transmission from pelargonium to pelargonium was possible only by grafting.

Lucerne mosaic and pea mosaic viruses were isolated from lupins with leaf symptoms suggestive of virus infection at Wisley in June 1959 [cf. **36**, 409; **39**, 682].

Five distinct viruses were isolated from celery plants, namely cucumber mosaic [cf. **36**, 446], lucerne mosaic [cf. **38**, 346], celery yellow vein, celery yellow spot, the most common disease in 1957–8 and somewhat resembling the disease described under this name in the U.S.A. [**25**, 287], and celery yellow net. Yellow vein was serologically related to tomato black ring and caused broad yellow bands along the leaf veins accompanied by some leaf distortion. Soil remained infective for 2 yr. Symptoms of yellow net included bright yellow bands along the major veins and lesser yellowing of the minor ones, together with necrotic pits and streaks on the petioles, eventually affecting the crown and proving lethal.

Pea mosaic virus, not previously regarded in England as a cause of streaking in sweet pea, was isolated from sweet peas with leaf mottling and necrotic stem streaking.

No infection of *Verbesina encelioides* [**31**, 121] could be induced by grafting with dahlias with mosaic symptoms; it is possible that the str. of dahlia mosaic or of the indicator plant in this country differs from those in the U.S.A.

The work done in collaboration with R. A. Lelliott (Plant Path. Lab., Harpenden) on freeze-dried preparations of plant viruses has been noticed [**40**, 91].

A description is given of a rapid serological test developed for carnation viruses and based on the methods of van Slogteren [**35**, 480; **39**, 244] and Mansi (*Nature, Lond.*, **181**, pp. 1289–1290, 1958). An area 40 mm. × 28·5 mm. on a slide is covered with 1 ml. 0·8% ionagar in which wells 5 or 8 mm. diam. and 1–2 mm. apart are cut. Two drops of antiserum to carnation mottle are placed in 1 well, to ring spot virus in another, and crude sap from young carnation leaves in a 3rd. Within 4 hr. a reaction develops, visible as a sharp line between the well of sap and the well containing the correct serum, reaching a max. in 24 hr.

In the sect. on Crop Protection (pp. 78–81) W. H. Read & J. H. Hughes report (further details on pp. 105–107) that no significant increase of tomato yields was obtained between plots sterilized with steam, chloropicrin, or Na methyldithiocarbamate, though all were far superior to untreated. Even traces of methyl *iso*thiocyanate remaining in soil are injurious to tomatoes, cucumbers, and lettuces.

Preliminary observations by J. T. Hughes (pp. 108–111) show that methyl *iso*thiocyanate is formed rapidly from Na N-methyldithiocarbamate (metham-sodium) in the presence of soil (0·09% methyl *iso*thiocyanate being equivalent to 0·2% metham-sodium).

These 2 workers with Pauline Smith & R. J. Smith showed that Cu-containing sprays were injurious to narcissus under certain conditions but zineb sprays did not always give good results against leaf scorch (*Stagonospora curtisii*) [cf. **39**, 314].

Attempts to prevent basal attacks of tomato stem rot (*Didymella lycopersici*) with captan are described by W. H. Read (pp. 80, 112–115). Tomato plants treated with 4 fl. oz. 0·25% captan 1 day after planting out gave better results than those treated with 3 fl. oz. 1 day before. Suspensions of pure captan were slightly phytotoxic and commercial formulations even more so. Its protective effect was apparently not due to systemic action.

Phillips (D. H.). **Report of the Mycological Department, 1959.**—*Rep. States Jersey, 1959*, pp. 64–80, 1960.

Among the records in this report [cf. **39**, 370] are the perfect state of tomato stem rot [*Didymella lycopersici*] found for the 1st time in Jersey, and *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* on tomato for the 1st time since 1919. *Phytophthora cryptogea* [map 99] caused a foot rot of tomato, but with little damage. Other new records included *Pythium ultimum* [map 207] on potato, powdery mildew (*Oidium*) on carrot [cf. **40**, 199]; *Peronospora destructor* [map 76] on onion; *Erysiphe polygoni* on anemone (the *Oidium* state being found in the previous year) and *Ranunculus*; black slime (*Sclerotinia bulborum*) on grape hyacinth; and *Rhizoctonia* [*Corticium*] *solani* on anemone and lily. Basal rot of *Narcissus* caused by *Fusarium oxysporum* f. *narcissi* was common, causing losses up to 30%, and *Armillaria mellea* and *Ramularia vallisumbrosae* were new records on this host.

Sibilia (C.). **Rassegna dei casi fitopatologici più notevoli osservati nel 1959.** [Review of the most noteworthy phytopathological records made in 1959.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 267–285, 3 fig., 1960.

Mention may be made of the following items in this report [cf. **39**, 263]. During the year showers were very frequent and temps. below average. Olive leaves and young branches were attacked by *Cercospora cladosporioides* [cf. **38**, 559] at San Remo, and olive fruits at Reggio Calabria by *Macrophoma dalmatica* [cf. **34**, 98]. Leaves of wild cherry and of the early var. Ravenna at Monterotondo were attacked by *Cylindrosporium padi* [*Higginsia hiemalis*: **39**, 425]. *Puccinia glumarum* [*P. striiformis*] occurred with exceptional severity early in May on wheat near Viterbo. *Ascochyta heteromorpha* infected oleander leaves [**19**, 582].

Rosa (M.). **Contributo ad una bibliografia fitopatologica italiana per l'anno 1959.** [A contribution to an Italian phytopathological bibliography for the year 1959.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 287–305, 1960.

A further list (328 titles) [cf. **39**, 264].

Wahlin (B.). **Sjukdomar och skadedjur på landbruksväxterna i nordöstra Götaland 1959.** [Diseases and pests of agricultural crops in N.E. Götaland 1959.]—*Växtskyddsnotiser, Stockh.*, **24**, 1, pp. 3–8, 4 fig., 1960.

Fungus diseases in general were relatively unimportant during the dry season under review [cf. **36**, 387]. There were 6 new outbreaks of potato wart (*Synchytrium endobioticum*).

Einige Ergebnisse der tschechoslowakischen Pflanzenvirologie in den Jahren 1957–1959. [Some achievements of Czechoslovak plant virology in the years 1957–59.]—Abs. in *Preslia*, **32**, 4, pp. 398–422, 10 pl., 1 fig., 1960.

Of 55 papers read at the conference of Czechoslovak plant virologists held in Litoměřice, 1–3 Dec. 1959, the following may be noted:

Jermoljev (E.) & Pozděna (J.). [Raising of the antisera titres through immunization by precipitin-antigen (Dunin 1958) from plant material.] (pp. 398–399). If fresh leaf sap was used, the titre of the antisera against beet yellows virus prepared by this method was 8 times, and against tobacco mosaic virus and *Pseudomonas lachrymans* 4 times the normal. The antiserum from potato tubers against [potato] virus X had lower titre than the others, but was effective, whereas that from beet roots against beet yellows virus reacted neither with root nor with leaf sap.

Brčák (J.). [Reaction of *Chenopodium* spp. to Tobacco mosaic virus (TMV).] (p. 400, 1 fig.). All 15 spp. inoculated with green and yellow TMV strs. developed symptoms of primary infection. In *C. polyspermum* a typical systemic infection of

light and dark leaf stripes developed, but in *C. murale* and *C. hybridum* systemic infection affected only the apical parts. On the stems of *C. quinoa* dark red spots appeared under the leaf scars and spread; 40 days later the red parts contained TMV of a titre 69% higher than other parts of the stalk.

Brčák (J.). [Super-infection with TMV in Xanthi Tobacco infected by Cucumber mosaic virus.] (p. 401, 1 fig.). After the inoculation of Xanthi tobacco leaves with purified TMV diluted $1:10^4$ a necrotic reaction different from normal developed because of previous CMV infection. Titres showed that CMV reduced the susceptibility of the plants to TMV and inhibited the spread of primary infection.

Blattný (C.). [Problems of aspermy viroses with particular regard to Clover spp. and Potato.] (p. 402). The group in question includes [tomato] stolbur and witches' broom viruses and their strs. on potato, various European aster yellows [virus] strs., clover phyllody [strawberry green petal virus], 'purple top' and 'yellow top' of potato, and other viroses of aster yellows type on cultivated plants and weeds. The need to study this group in its totality is emphasized.

Blattný (C.). [Occurrence of viral galls and remarks on synonymy in *Stellaria media*.] (p. 402). Symptoms are given of the strs. of aster yellows [virus], [tomato] stolbur [virus], 'purple top', 'yellow top', and clover phyllody [strawberry green petal virus]. Galls (2–8) were formed only on seriously affected plants in Dec.–Mar. Some described sspp. are really virus infected plants.

Brčák (J.). [On the influence of air humidity on the effectiveness of the transmission of non-persistent viruses by aphids.] (p. 404). Experiments with 388 *Myzus persicae* [cf. **38**, 585] aphids and 194 beet plants showed that the insects starved for 2 hr. before feeding in relatively dry air transmitted [beet] mosaic [virus] more effectively than those starved in humid air. This effect increased steadily for R.H. 100–34%, but was less at 0%—a physiologically unfavourable condition for the aphids –than at 34%. It is inferred that transmission was facilitated by more intense sucking by the aphids kept in dry air, owing to their loss of water.

Novák (J.). [The use of film technique in the study of virus diseases.] (p. 404). A film camera, devised to take pictures at required intervals, was conveniently used for the study of the dynamics of virus infection, e.g. the emergence and growth of local necrotic lesions [caused by TMV] in *Nicotiana glutinosa*, the differences in the initial TMV systemic infection between tobacco vars. Samsun and White Burley, and the development and dissolution of inclusions and formation of paracrystals.

Protsenko (A. E.) & Legunkova (Mme R. M.). [The behaviour of Tomato stolbur and summer Aster yellows viruses in the conditions of artificial infection.] (p. 405, 2 fig.). On the strength of symptomatological criteria [cf. **38**, 734] and differential geographical distribution in the U.S.S.R. it is confirmed that the yellows of kok-saghyz [*Taraxacum kok-saghyz*: cf. **36**, 88] and other plants is identical with the American aster yellows, from which stolbur of tomato and other Solanaceae is distinguished, the respective viruses having been designated by V. L. Ryzhkov as *Leptomotrophus callistephi* and *L. solani*.

Blattný (C.). [An attempt to analyse a focus of summer Aster yellows (psuedoclassical stolbur).] (p. 406, 2 fig.). In an isolated garden in Břevnov, Prague, yellows was noticed on celery, tomato, leek, cauliflower, Brussels sprouts, cabbage, clover (*Trifolium repens*), *Antirrhinum majus*, and other garden plants and weeds, but not on strawberry or black currant. Proliferation [apple witches' broom virus] was frequent on apple. The scarcity of leafhoppers as vectors suggested the existence of latent perennial hosts.

Limberk (J.). [A contribution to the knowledge of strain composition of Potato witches' broom disease.] (p. 407, 2 fig.). *Nicotiana glauca* plants graft-infected with potato scions carrying witches' broom [virus: cf. **38**, 680; **39**, 487] suffered from (1) dying-off of buds, or (2) stunting of crowns and sexual organs and excessive

growth of calyces. Two yr. later scions of these plants grafted to tomato transferred the infection, which caused (1) strong anthocyanin pigmentation and thickening of stem tops up to 2–3 times normal width, a failure to flower, general resemblance to plants suffering from Australian big-bud disease, and the dying-off from the top downwards; or (2) moderate pigmentation and branching of stem tops (not thickened), moderate reduction of the pinnae, stunting of crowns and sexual organs, and excessive growth of calyces with concrescent tips. These differences are believed to be due to the existence of two distinct strs. in the original isolates.

Bojňanský (V.). [A contribution to the aetiology of spindle sprout in Potato.] (pp. 407–408). Germinating potato tubers (1,460) from leaf-roll infected stands developed 'half' hair-sprouts only in 0·4%. A mixture of healthy tubers and others infected by leaf roll and [potato] virus Y and seedlings, all grown in isolators, developed spindle sprout and loss of viability only in 0·24% seedlings, while germination of 2,740 tubers was normal with 1 exception, and 'half' hair-sprouts appeared in 1·22% (including seedlings). It is concluded that neither of these viruses is responsible for spindle sprout [cf. **38**, 98].

Novák (J. B.). [Remarks on the viroses of bulbous vegetables.] (p. 408, 2 fig.). No difference in susceptibility to onion yellow stripe [onion yellow dwarf virus] was noticed in 6 Czechoslovak vars., whereas Zittauer was less resistant. Heavier dressing with N fertilizers gave much more severe symptoms than with mixed fertilizers. Diseased plants yielded 57–80% less seed, which germinated 64%. Yellow stripe in garlic was characterized by short light stripes. Onion yellows is attributed, on the strength of comparative studies, to a virus of the aster yellows group.

Červenka (J.). [Concerning health problems of Potato plants.] (pp. 408–409). In several localities in Czechoslovakia regular weather, aphid, and plant health records [cf. **35**, 628] have been kept and studied since 1956 and, in addition, serological tests were used in 1959. The latter disclosed the presence of many latent viroses in 15 vars.

Brčák (J.). [On the use of Potato hybrids A6 for a quick determination of virus Y and on the possibility of an occurrence of Tobacco vein-browning in Czechoslovakia.] (p. 410, 1 fig.). Detached pinnae of the hybrid A6 (*Solanum demissum* × Aquila) inoculated mechanically with potato virus Y developed necrotic rings by the 3rd day (4 days earlier than tobacco); [potato] virus A produced small necrotic stars and TMV necrotic veins, the latter 25 hr. after inoculation. Tests on A6, tobacco, *Nicotiana glutinosa*, *Datura metel*, and *Petunia hybrida* showed that vein necrosis of Slovak tobacco was caused by a str. of potato virus Y and was distinguished from its common strs. on potato only by weaker symptoms, which were not identical with those of vein-browning reported from Germany [**39**, 349, 737].

Brčák (J.). [*Tetragonia expansa* Murr. as a field indicator plant of the presence of Beet yellows virus.] (p. 410, 1 fig.). Systemic infection of *T. expansa* with beet yellows virus [cf. **36**, 157] produced a white, yellow, or orange-yellow net pattern and deformation of leaf blades (varying according to str.), easily distinguishable from the symptoms of physiological disorders. Being immune from beet and cucumber mosaic viruses, highly susceptible to beet yellows, and being abundantly attacked by aphids, *T. expansa* is useful for the identification of beet yellows virus.

Blattný (C.). [Possibility of the existence of a new seed-borne Sugar Beet virosis.] (p. 410, 3 fig.). The symptoms were irregular green colouring of the leaves: pale dots, spots, and rings; tiny necroses; inward leaf rolling; rarely light veins with dark bands; and vein thickening and yellowing following mechanical transmission. Transmission by seed (from 2 Central Bohemian localities) was $< 5\%$ in spring and summer sowings and 1% in winter; mechanical inoculation gave 50%, mechanical back inoculation from *Chenopodium capitatum* 20%, and back inoculation through *Myzus persicae* 5% infection. Various transmissions to sugar beet

Chot'ovka, *Beta patellaris*, and some *C.* spp. were less effective than to sugar beet, particularly in autumn, or unsuccessful, and *T. expansa* [cf. Brčák above] proved immune from any kind of inoculation. With mechanical inoculation the incubation period was 11–18 days in spring and summer and 23–33 in autumn, and temp. tolerance was ca. 60° C. The infected plants grew feebly, but their germination was not affected. The viral nature of this disease was not confirmed.

Kvíčala (B. A.), Dlábek (F.), Héger (M.), & Smrž (J.). [The occurrence of the bug-transmitted Beet leaf curl virus disease of Sugar Beet in Czechoslovakia.] (pp. 411–412, 3 fig.). This disease [cf. **38**, 435] was reported from several localities in Přelouč district [east of Prague] in 1959. It is admitted that it might have been present there for the preceding 2 yr., but had not been recognized.

Průša (V.). [Wheat striate [mosaic] virus—the second cereal virus in Czechoslovakia. Symptoms of Wheat striate virus. Transovarial transmissibility of Wheat striate virus.] (pp. 412–413, 1 fig.). This disease, recently discovered in Czechoslovakia, was transmitted by both larvae and imagos of *Calligypona* [*Delphacodes*] *pellucida* [cf. **39**, 564] after at least 9 hr. acquisition feeding, the effect varying largely with individual insects. Some leafhoppers acted as vectors of wheat striate mosaic only, others as simultaneous vectors of oat sterility and stunting virus [**39**, 166], others as exclusive vectors of the latter disease, and again others were non-viruliferous. Extracts from the insects and infected wheat leaves failed to incite the disease.

Symptoms of wheat striate mosaic on various cereals, particularly wheat and barley, are described and the effects of the infection discussed. On Triumph barley necroses developed, together with regular symptoms.

The virus was transmitted by 14·9% *D. pellucida* larvae of vector parents, this being considered the 1st record in Europe of 'inherited' viral pathogenicity in an insect. Simultaneous occurrence in the larvae of oats sterility and stunting virus (non inherited) had no disturbing effect. The infectivity of wheat striate mosaic virus increased by 61·6% after 26–34 days' incubation in the larvae and by 98·2% after 40–51 days.

Vacke (J.). [A contribution to the knowledge of the host range of Wheat striate [mosaic] virus.] (p. 413, 1 fig.). In the glasshouse *D. pellucida* transmitted wheat striate mosaic to *Lolium multiflorum* [cf. **38**, 735], *Bromus arvensis*, *B. mollis*, and to a less degree to *L. perenne*, but not to *Phleum pratense* (infected up to 15% in nature) or 24 other spp. of Poaceae. The disease now represents a serious threat to forage grasses, its incidence in some parts of the Bohemian-Moravian boundary zone rating 8–32% according to the host.

Neubauer (Š.). [A contribution to the knowledge of viroses in some officinal plants.] (pp. 413–414, 2 fig.). Aspermy of *Solanum aviculare* was characterized by lighter leaves than normal, particularly their veins, hypertrophy of calyces, absence of crowns, and degeneration of sexual organs. Solasodin content in the diseased plants was reduced by 50–75%. Both grafting to tomato and back-grafting induced symptoms of pseudoclassical stolbur [aster yellows]. *D. pellucida* is suspected to be the vector.

A hitherto undescribed virosis causing large yellow or white leaf spots on peppermint and especially on a Russian [unnamed] var. in Czechoslovakia, the latter highly resistant to *Puccinia menthae*, was graft-transmitted to healthy seedlings.

Pintera (A.). [Attempts to transmit Spruce virosis through aphids (*Aphidoidea*).] (pp. 414–415). Transfer of *Sacchiphantes* [*Adelges*] *abietis* and *Cinaropsis pilicornis* from infected trees to healthy seedlings resulted in a transmission of the disease [? spruce mosaic virus], which induced in 1st yr. seedlings asymmetrical growth, inhibition of the growth of the main stem apex, and thickening of side-shoots, in 2nd yr. seedlings additionally the formation of 2–3 main stem apices, brushy needles (in 7 of 11 seedlings), and needle cast (1). After a reduction or dis-

appearance of symptoms for 1–2 following yrs. the shoots of the 2nd flush in the 2nd or 3rd whorl from the top became discoloured in 7, needles largely lost in 3, and the 2nd main stem apex developed in 3 of 22 seedlings.

Blattný (C.) & Blattný (C.). [A question of classification of the virus causing proliferation of Apple.] (p. 415, 1 fig.). Proliferation [apple witches' broom virus] disease has been known in Czechoslovakia since 1953, but has scarcely occurred in nurseries. Implantation of small disks of tissue from severely affected leaves and axes resulted in 2% transmission. A severely infected Cox's Orange cordon produced double flowers with stamens converted into petals and partially or totally phyllodic flowers with atrophied petals and sexual organs and with calyx tips converted into leaves. Typical symptoms on graft-inoculated seedlings (3 of 5) appeared 21–97 days after inoculation. This transmission method can be used *in vitro* for the detection of latent forms of the disease in mother trees.

Králiková (Mme K.). [A contribution to the knowledge of prune dwarf [virus] in Plum.] (pp. 415–416, 2 fig.). This disease was transmitted to plum, peach, apricot, almond, and sweet cherry. Italian prune and greengage were severely attacked, stunted in growth and produced deformed leaves, whereas Bystricer and Althans plum developed only primary mosaic symptoms. Yields were reduced by up to 50%.

Blattný (C.). [Virus canker on Cherry trees in Czechoslovakia.] (p. 416, 3 fig.). This disease, first noticed in Czechoslovakia in 1955, is reported to differ from [cherry] black canker [virus] and from Frogmore virus canker [cf. **37**, 173]. It was transmitted to sweet cherry seedlings by grafting. The name 'destructive canker' is proposed.

Kvíčala (B. A.), Dlábek (F.), Héger (M.), Honsa (M.), Jagemann (E.), & Smrž (J.). [Occurrence and distribution of the virus šarka-disease of stone fruit in Czechoslovakia.] (pp. 416–417, 1 fig.). A report on the control measures taken by Min. Agric. to check the spread of šarka [plum pox virus: cf. **37**, 87], including, *inter alia*, field examinations at the time of ripening, registration of attacked trees, and prohibition of sale of nursery material suspected of infection.

Čech (M.) & Pozděna (J.). [On some properties of Hop infectious sterility virus.] (p. 417, 1 fig.). A pure isolate of this virus [hop nettlehead virus: cf. **39**, 482] was prepared from hop seedlings mechanically inoculated with an unpurified isolate and from hop plants with inherited infection transmitted by seed. By the electron microscope particles were rod-shaped, slightly bent, and mostly 690 mμ long; its isoelectric point (determined turbidimetrically) was ca. pH 3·7.

Pozděna (J.), Kříž (J.), & Čech (M.). [Mechanical transmission of Hop infectious sterility virus.] (p. 417). To eliminate agents inhibiting mechanical transmission of the virus extracts containing 0·1 M Na_2HPO_4+3% nicotine or 5 g. ascorbic acid neutralized to pH 7·5 with N NaOH were used as inoculum. Transmission rate was 73–88% (compared with 33% for raw sap), but the percentage declined with the age of both the inoculated and the inoculum-supplying plants. Good results were obtained with raw sap: extract solution ratios 1:1 and 1:5.

Blattný (C.), Dohnal (T.), & Procházková (Mme Z.). [On viral leaf roll of Vine.] (pp. 418–419, 2 fig.). Vine leaf roll [virus] was transmitted (100% to cuttings) by inarching, the shortest incubation period being 3 months in the glasshouse and 10 months in the vineyard [but cf. **39**, 70]. It is not precluded by roncet [vine infectious degeneration virus], which, like mosaic [ditto], is a distinctly different disease.

Fourteenth Report of the Committee for Colonial Agricultural, Animal Health and Forestry Research. Fifteenth Report.—*Colon. Res., 1958-1959*, pp. 20–192, 1959. 17*s.*; *1959–1960*, pp. 23–160, 1960. 18*s.*

In addition to information already noticed the following items of interest may be

noted in these reports. In para. 32 of the 14th report [cf. **38**, 293] *Oidium heveae* and *Helminthosporium heveae* are reported on rubber in the British Cameroons, *Spongospora subterranea* [map 34] on potato in Kenya, and *Mycosphaerella musicola* [map 7] on banana, *Guignardia citricarpa* on lemon, and *Diaporthe citri* on citron in Nigeria.

Evidence is accruing in Trinidad (para. 200) that the use of Cu sprays on cacao, especially when mist-blown, increases yields, quite apart from disease control [cf. **38**, 735; **39**, 15].

In Sarawak (para. 288) *Fusarium solani* and *Rhizoctonia* sp. have been frequently isolated from [black] pepper; they appear to be early colonisers after infection by the *Phytophthora* sp. causing root disease [cf. **36**, 498]. *Pythium splendens* and a *Sclerotium* sp. appeared to be responsible for damping-off of pepper seedlings.

In para. 159 of the 15th report reference is made to a gall-forming disease of cacao which appears occasionally in Ghana and other W. African territories [**40**, 32] and resembles the 'cushion gall' or 'buba' disease of Central America [cf. **39**, 563]: para. 385 notes the presence of 'cushion gall' in W. Nigeria.

New records in para. 183 include *Chloridium musae* and *Piricularia musae* on banana in the Cameroons; *Ramichloridium musae* on banana in Sierra Leone and British Solomon Islands Protectorate; *Cladosporium colocasiae* on *Colocasia esculenta* in N. Borneo, Sarawak, and Mauritius; *Mycosphaerella alocasiae* [on *Alocasia* spp.] and *Leptosphaeria michotii* [cf. **39**, 657] on sugarcane in British Solomon Islands Protectorate; *Pseudoplea trifolii*, prevalent in N. Nigeria and Nyasaland, Sarawak, and other areas; and *Glomerella vanillae* on vanilla [cf. **37**, 365] in the Seychelles. This fungus, which ruined the vanilla industry there at the beginning of this century, has been controlled by phytosanitary measures (including the burning of infected vines) and spraying with Bordeaux (para. 406).

In N. Borneo (para. 378) *Helminthosporium torulosum* [*Deightoniella torulosa*] was isolated from abaca [*Musa textilis*] sheaths. In Trinidad (para. 383) it was not found possible to transmit a grapefruit disease with symptoms resembling those of tristeza virus [**32**, 66] nor a die-back of lime with symptoms suggesting a virus [cf. **34**, 709]. In Jamaica (para. 388) assessment of resistance to lethal yellowing [**39**, 536] among dwarf coconut vars. showed that St. Lucia dwarfs are not immune, but they may be very resistant [**35**, 366]; Fiji dwarfs have not yet succumbed. *Puccinia psidii* on pimento [*Pimenta officinalis*] was controlled by dithane Z-78 at 3 lb. 100 gal. as a low-volume mist spray (para. 401) [cf. **39**, 121]. In Uganda (para. 391) coffee berry disease (*Glomerella cingulata*) [**39**, 152] was noted for the 1st time in a trial of Arabica vars. at 6,200 ft. in N. Bugisu. In Cyprus (para. 396) lime-sulphur and cupravit at 3% and 0·625%, respectively, gave good results against loquat scab (*Spilocaea eriobotryae*) [cf. **38**, 657]. Two applications were made before the flowers opened and 4 after fruit set (at 15-day intervals). Satisfactory control of *Gymnosporangium sabinae* on pear was given by Cu sprays applied from early June onwards at 12-day intervals (para. 398). In Mauritius (para. 397) *Ascochyta zeae* [cf. **31**, 281] on maize was recorded for the 1st time. In N. Borneo (para. 402) rice diseases recorded [cf. **40**, 151], all controlled by a Cu fungicide, included *Trichoconis padwickii*, *Nigrospora* sp., and *Curvularia* sp.

FELDMAN (J. M.) & PONTIS (R. E.). **Plant diseases in the Province of Mendoza, Argentina.**—*F.A.O. Plant Prot. Bull.*, **8**, 10, pp. 117–119, 1960.

Among the 205 diseases of grapes, fruit trees, and vegetables in the province [cf. **39**, 374], *Xanthomonas pruni* [map 340] on prunes [plum] and *X. juglandis* [133] on walnuts may be noted.

ROGER (L.). **Les problèmes phytopathologiques en République Malgache, dans l'Archipel des Comores, et à l'Île de la Réunion. Organisation des recherches**

dans ces pays. [Phytopathological problems in the Republic of Madagascar, the Comoro Islands, and the Island of Réunion. The organization of research in these countries.]—199 pp. (+pp. 1a-b, 5A-G), 2 maps, Paris, Office de la Recherche Scientifique et Technique Outre-Mer, 1960. [Mimeographed.]

This report on the author's visits in 1959 deals with the geography, climate, and production of the areas, phytopathological problems, and research in relation to local problems. Much of the information on plant diseases has already been noticed [cf. **30**, 630, *et passim*].

The coffee root rot in Madagascar caused by *Clitocybe* sp. (pp. 30 33) (not yet definitely identified as *C. tabescens*) [cf. **37**, 408] is fully discussed with reference to previous investigations; in the E. coastal region the fungus is 10 times as common on coffee as all other fungi together. It also attacks tea, coconut, cassava, and numerous spp. of shade trees. The disease is mainly present in alluvial soils and is much less prevalent at higher altitudes. The control methods recommended [loc. cit.] are effective if carried out thoroughly, but new techniques are needed for large plantations. The biological characters of the fungus require to be studied in further detail. The susceptible shade tree *Albizzia lebbeck* should be replaced by a resistant tree, such as *Croton mubango* from the Congo.

Phthiriosis disease of coffee (pp. 33–34) [**13**, 506] is increasing alarmingly, especially in E. Madagascar. Conidia of *Polyporus coffeae* [cf. **29**, 301] have never been observed in association with the disease in Madagascar. It is present, though in an irregular fashion, along the entire length of the E. coast, chiefly in dry, sandy soils favourable to coccids, but also in rainy areas up to 600 m. high. Spread takes place principally in dry weather. In 1958 an outbreak occurred at Ivoloina Station on 5-yr.-old Robusta trees, chiefly at the highest altitudes and on the heaviest soils. Old Excelsa and Liberica trees do not appear to suffer. No other host is known in Madagascar.

The coffee wilt around Faratsiho caused by *Fusarium* sp. near *lateritium* (p. 38) [**39**, 708] occurs in the cool season and the conidial fructifications form only below 20° [C.]. The fungus develops slowly over a period of several yr.; old coffee can resist it, but young trees succumb; the disease remains latent during hot weather.

Chlorotic streak virus [map 29] (p. 57) occurs sporadically on sugarcane. It is prevalent in E. Madagascar on Pindar though seldom found on M. 134·32; on the W. coast the disease is less common, though causing concern on B. 37172. The presence of ratoon stunting virus has not been confirmed in Madagascar. Red stripe (*Xanthomonas rubrilineans*) [map 39] is present sporadically. Near Brickaville it becomes rather prevalent on B. 4362 between Feb. and the opening of the wet season, after which it disappears.

A very full account (pp. 63 71) is given of the vanilla disease caused by *F. bulbigenum* var. *batatatis* [*batatas*] f. *vanillae* and *F. oxysporum* [cf. **38**, 657], present throughout Madagascar wherever the host occurs and now becoming more severe.

A coconut heart rot (p. 97), the cause of which has not yet been determined, occurs in 1 or 2 plantations on the W. coast, where it is serious; it does not appear to be associated with *Phytophthora palmivora* and only mature palms are affected [cf. **35**, 180].

Symptoms suggestive of citrus tristeza virus and possibly of citrus stubborn disease virus are evident in the Tuléar area (pp. 111–113) [**34**, 593], but the viruses have not yet been identified conclusively. In Réunion sugarcane is affected by ratoon stunting virus [map 318] (pp. 145–150), but its importance there has probably been exaggerated.

Report of the Third Meeting of the Plant Protection Committee for the Southeast Asia and Pacific Region. Held in New Delhi, India, 7–12 December, 1959.—

26+6 pp., Rome, Food and Agriculture Organization of the United Nations, 1960. [Cyclostyled.]

On pp. 8–14 of this report [cf. **37**, 576] the plant quarantine activities of participating governments are outlined. In the sect. (pp. 16–18) dealing with measures for regulating importation and movement of plants and plant products it is noted that a disease similar to 'grassy shoot' [**39**, 373] has been found on sugarcane in Thailand.

New records in the region.—*Quart. Rep. F.A.O. Plant Prot. Comm. S.E. Asia and Pacific Region, Apr.–June*, pp. 5–8, 1960.

Among the new records in this report from the F.A.O. Regional Office for Asia and the Far East, Bangkok, Thailand, some of which have already been noticed, are *Pseudomonas solanacearum* causing a seedling wilt of teak in Malaya, Al toxicity of pepper in Sarawak, and maize rust (*Puccinia polysora*) [map 237] in Vietnam.

Clifton (C. E.), Raffel (S.), & Starr (M. P.). **Annual review of microbiology. 14.**—391 pp., 14 fig., Palo Alto, Calif., Annual Reviews, Inc., 1960. $7 (U.S.A.); $7.50 (elsewhere).

In this vol. [cf. **39**, 80], which includes cumulative author and chapt. title indexes to vol. **1–14**, P. R. Day (pp. 1–16: 143 ref.) discusses present knowledge on variation in the pathogenicity of phytopathogenic fungi, under the headings 'physiological specialization', and 'origin of new races'. In another paper of particular interest to plant pathologists H. M. Rose & C. Morgan (pp. 217–240: 172 ref.) review the fine structure of virus-infected cells under the headings 'viruses developing primarily in the cytoplasm', 'viruses developing primarily in the nucleus', 'bacterial viruses', 'insect viruses', 'plant viruses', and 'viruses associated with tumors'.

H. C. Lichtenstein (pp. 17–42: 148 ref.) reviews the literature on microbial nutrition published in the preceding 18 months, with special reference to the influence of nutrition on the formation of enzymes and various products and the influence of incubation temp. on the nutritional requirements of micro-organisms.

S. P. Owen (pp. 99–120: 169 ref.) [cf. **33**, 439] reviews industrial fermentation work and A. J. Crowle (pp. 161–176: 83 ref.) the factors affecting the interpretation of immuno-diffusion tests, a term covering double-diffusion-, simple diffusion-, and immuno-electrophoretic tests.

Buchner (P.). **Tiere als Mikrobenzüchter.** [Animals as breeders of microbes.]—160 pp., 102 fig., Berlin, Springer-Verlag, 1960. DM 8.80.

This well-illustrated book covers various aspects of symbiotic relationships between animals (mostly insects) and bacteria or fungi, with numerous examples.

Lawson (D. F.). **The technique of photomicrography.**—xvi+256 pp., 75 pl. (4 col.), 108 fig., 6 graphs, London, George Newnes, Ltd., 1960. 55*s*. [6 pp. ref.]

The headings of the 16 chapt. of this comprehensive survey of modern techniques include 'the microscope'; 'objectives and eyepieces'; 'the condenser'; 'various types of illumination'; 'the camera'; 'different aspects of photomicrography'; 'processing plate and paper'; and 'mounting and staining'. The variety and number of the illustrations are an outstanding feature.

Gunsalus (I. C.) & Stanier (R. Y.) (Editors). **The Bacteria : A treatise on structure and function. Vol. I. : Structure.**—xiv+513 pp., New York and London, Academic press, 1960. $13.

This vol., the 1st of 5, of an authoritative, comprehensive, and well-produced survey of general aspects of bacteria other than the taxonomic, contains useful

chapt. on 'The internal structure of the cell' by R. G. E. Murray (pp. 35–64), 'Surface layers of the bacterial cell' by M. R. J. Salton (pp. 97–144), 'Morphology of bacterial spores, their development and germination' by C. F. Robinow (pp. 207–249), 'Bacterial viruses—structure and function' by T. F. Anderson (pp. 387–412), and 'Antigenic analysis of cell structure' by E. S. Lennox (pp. 415–439).

Van Assche (C.). **Fytopathogene bacterien.** [Phytopathogenic bacteria.]—*Agricultura, Louvain*, Sér. 2, **8**, 3, pp. 409–420, 3 fig., 1960. [Fr., Engl. summ.]

The study of bacterial plant diseases, the prevalence of which appears to be increasing in Belgium, is considered to merit more attention than it has hitherto received. The pathogens herein described are a Gram+ *Bacillus* sp., causing cork disease or rust (hitherto attributed to a physiological disorder) of *Sansevieria trifasciata*, and 3 Gram— *Pseudomonas* spp., responsible, repectively, for a rot of *Cyclamen persicum* tubers, stem rot of Cox's Orange Pippin, Jonathan, and James Grieve apple vars., and black spotting of tomato stems in W. Flanders, Antwerp, and Brabant.

The *B.* sp. on *S. trifasciata* occurs not only on home-grown plants but also on those imported, e.g. from the Congo and U.S.A. (Fla). The development of the *P.* sp. on *C. persicum* is promoted by previous infection with *Cylindrocarpon radicicola*. The former may be controlled by spraying with agrimycin 100 at 300 p.p.m.

Klement (Z.) & Lovrekovich (L.). **Comparative study of Pseudomonas species affecting Hemp and the Mulberry tree.** *Acta microbiol. Acad. Sci. Hung.*, **7**, 2, pp. 113–119, 1 fig., 1960.

Pseudomonas cannabina in Hungary [**40**, 49] is now thought to be closely related to *P. mori* [cf. **35**, 766] on the basis of biochemical and antigenic characters and sensitivity to bacteriophage. It may be a f.sp. of *P. mori*, but the relationship between *P. cannabina* and *P. caryophylli* suggested by Šutić and Dowson [**38**, 408] was not confirmed by serological and phage studies.

Heimpel (A. M.) & Angus (T. A.). **Bacterial insecticides.**—*Bact. Rev.*, **24**, 3, pp. 266–288, 2 fig., 1 graph, 1960. [121 ref.]

A discussion of the taxonomy and characteristics of 2 crystalliferous bacteria, *Bacillus thuringiensis* and *B. entomocidus*, which produce an endotoxin poisonous to lepidopterous and some dipterous larvae.

Balfour-Browne (Frances L.). **The green muscardine disease of insects, with special reference to an epidemic in a swarm of locusts in Eritrea.**—*Proc. R. ent. Soc. Lond.* (*A*), **35**, 4–6, pp. 65–74, 1960. [64 ref.]

Following a brief account of large numbers of locusts being killed by *Metarrhizium anisopliae* [cf. **39**, 540] in Eritrea in Feb. 1959 the literature is briefly reviewed and the natural and artificial host ranges of the pathogen are tabulated. It is concluded that *M. anisopliae* is only able to attack insects under conditions of high humidity and temp. and the prospects of its use for biological pest control are not favourable.

McNew (G. L.). **Fungicides and bactericides for controlling plant diseases.** *Biol. & Chem. Control Plant & Animal Pests, 1960*, pp. 49–71, 1960. [74 ref.]

This paper from Boyce Thompson Inst. for Plant Research, N.Y., notes that the essential attributes of an effective microbiocide are: (1) ability to penetrate fungus membranes, (2) reaction with cell metabolites to disrupt their normal functioning, (3) selectivity, and (4) stability. The design of organic molecules to attain these attributes is reviewed in the light of the literature, together with recent developments with antibiotics.

Blumer (S.) & Kundert (J.). **Über den Einfluß der Temperatur auf die Wirkung von Fungiciden.** [The effects of temperature on the action of fungicides.]—

Landw. Jb. Schweiz, N.S. **9 (74)**, 5, pp. 465–496, 10 graphs, 1960. [Fr., Engl. summ. 13 ref.]

In further studies at Wädenswil Exp. Sta., Zürich, [**34**, 275], it was established that under carefully standardized conditions the LD_{50} values for growth are comparable to those for germination, when $CuSO_4$, hydroxyquinoline, and glyodin were tested against *Alternaria tenuis*, *Clasterosporium carpophilum*, *Botrytis cinerea*, and *Monilia* [*Sclerotinia*] *fructigena*. The improvement of temp., nutrient status, pH. time of culture, and use of mycelial instead of spore inoculum, towards the opt. conditions for each fungus, all raise the LD_{50} values. Fungal sensitivity to a given fungicide varies for germination and for mycelial growth.

Some fungi form mucilaginous substances in culture which protect growing hyphae against the fungicides and raise the LD_{50} values considerably. Since the sensitivity of a particular fungus str. to a fungicide may change after a period in culture the results of bioassays are comparable only for a limited period.

NANGNIOT (P.). **Possibilités de la méthode polarographique au dosage d'insecticides et de fongicides.** [Possibilities of the polarographic method for the dosage of insecticides and fungicides.]—*Parasitica*, **16**, 3, pp. 85–94, 1960.

The advantages of the polarographic method of electroanalysis, which is fully described from the Inst. agron., Gembloux, Belgium, are its great sensitivity, comparable with that of colorometric methods, suppression of all intermediate chemical reaction (the compound under test usually being directly oxidized or reduced at the electrode), and the possibility of examination without interference of disturbed or coloured solutions.

The method permits the simultaneous determination (without previous separation) of Cu, Pb, and Zn, provided that the concs. are of the same order of magnitude. The NO_2 group lends itself very well to the method, which is applicable also to the derivatives of thiocarbamic acid.

RAYNER (R. W.). **Separate determination of copper fungicide dosage on the upper and lower surfaces of leaves.**—*J. agric. Engng Res.*, **5**, 4, pp. 441–442, 1 fig., 1960.

By means of a perspex plate, drilled with $\frac{1}{8}$ in. holes $\frac{3}{8}$ in. apart, with a central upright rod, lowered into a Buchner funnel which can be filled with N H_2SO_4 or water to the required level, leaf disks are floated on the acid, upper or lower surface down, to dissolve away the Cu deposit, which is similarly washed off with water. The deposit on the opposite surface is then measured by a modification of Martin's method [**35**, 908], using the biscyclo-hexanone oxalydihydrazone reagent.

SEMANGOEN (H.). **Pertjobaan pemakaian naftenat tembaga sebagai fungicida.** [Copper naphthenate as fungicide.]—*Publ. Univ. Gadjah Mada* 2nd lustrum. 23 pp., 4 fig., 3 graphs, 1959. [Abs. from Engl. summ.]

In comparative spraying trials at Jogjakarta, Indonesia, 1·5% Cu naphthenate [cf. **38**, 649; **39**, 531] controlled blight (*Phytophthora infestans*) on potato, but was uneconomic in comparison with cheaper fixed coppers (perenox and Shell Cu fungicide)+sticker.

Leaf spot (*Cercospora personata*) [*Mycosphaerella berkeleyi*] on groundnut was controlled by 0·75% Cu naphthenate and the yield increased by 20–30%, but it is doubtful even so whether its use is economic.

VAN DER KERK (G. J. M.). **Tien jaar organotin-onderzoek.** [Ten years of organotin research.]—*Chem. Weekbl.*, **56**, 23, pp. 339–349, 1 diag., 2 graphs, 1960. [Engl. summ. 37 ref.]

This survey of studies at the Organisch Chemisch Instituut T.N.O., Utrecht, Netherlands, and elsewhere, comprises 3 sect. The 1st is introductory, dealing with

certain general aspects of organo-metal chemistry and in particular with that of the 4th main-group elements, some important properties of organo-tin compounds, and the principal methods for their synthesis.

Sect. 2 is a summary of work on the biocidal, especially fungicidal, properties of the last-named group [cf. **38**, 58, 59, *et passim*], notably the tributyltin compounds, e.g. tributyltin oxide, which have given encouraging results as industrial fungicides and bactericides. In many respects their activity exceeds that of organo-mercurials and chlorinated phenols. Rapid progress is also being made in the development as agricultural fungicides of triphenyltin compounds, a remarkable feature of which is their capacity to produce heavy increases in yield. The organisms used in the laboratory tests on which the author's observations are based included *Botrytis allii*, *Penicillium italicum*, *Aspergillus niger*, *Rhizopus nigricans* [*R. stolonifer*], and *Pseudomonas phaseolicola*.

The final section is concerned with the synthetic developments founded on the reactivity of the tin-H bond towards aliphatic double and triple bonds. The use of organo-tin hydrides as starting materials facilitates the preparation of hitherto inaccessible types of functionally substituted organo-tin compounds.

Van den Bos (B. G.), Koopmans (M. J.), & Huisman (H. O.). **Investigations on pesticidal phosphorus compounds. I. Fungicides, insecticides and acaricides derived from 3-amino-1,2,4-triazole.**—*Rec. Trav. chim. Pays-Bas*, **79**, 7, pp. 807–822, 1960.

The preparation at the Central Res. Lab., Weesp, and the Agrobiological Lab. 'Boekesteyn', Netherlands, and biological properties of compounds formed by substituting a P-containing group for an H-atom in the 1,2,4-triazole nucleus are described.

Ciferri (R.) & Scardavi (A.). **Efficacia anticrittogamica di alcuni zineb a diverso grado di finezza.** [The fungicidal efficacy of some forms of zineb with different degrees of fineness.] *Notiz. Malatt. Piante* 52 (N.S. 31), pp. 7–14, 5 graphs, 1960. [Engl. summ.]

Laboratory tests with 4 commercial dusts containing zineb, each manufactured in 4 different degrees of micronization, against *Stemphylium sarciniforme* confirmed earlier findings of Corte, Ciferri & Grandi [cf. **38**, 122] that fungicidal activity increases (up to a certain limit) inversely with particle size.

Lhoste (J.). **Sur l'efficacité du carbatène utilisé seul ou associé au cuivre contre la tavelure du Poirier et le mildiou de la Vigne.** [On the effectiveness of carbatene used alone or together with copper against Pear scab and Vine mildew.] —*C. R. Acad. Agric. Fr.*, **45**, 17, pp. 883–889, 1959.

Experiments at Lab. des Pesticides, Procida, France, described in detail, showed that carbatene (80% polyethylene bis thiuram disulphide + 20% polyethylene bis thiuram monosulphide) [cf. below] gives excellent control of pear scab (*Venturia pirina*), but that carbatene + tetra-Cu oxychloride is more effective against vine mildew (*Plasmopara viticola*).

Guillemat (J.) & Lambert (J.). **Étude du pouvoir fongicide du carbatène. Étude des mélanges carbatène et sels cupriques.** [A study of the fungicidal power of carbatene. A study of mixtures of carbatene and copper salts.] —*Phytiatrie-Phytopharm.*, **9**, 1, pp. 7–21, 1960.

In studies at Lab. Path. vég. E.N.A., Grignon and Lab. des Fongicides de P.R.O.C.I.D.A. the dosages completely inhibiting spore germination of *Alternaria citri*, *Fusarium caeruleum*, *F. roseum*, *Botrytis allii*, and *Plasmopara viticola* were determined for carbatene [see above], zineb, Cu oxychloride, and $CuSO_4$ and for

mixtures of these. Carbatene was as active or nearly as active as Cu oxychloride or $CuSO_4$, its power of inhibition being 3–11 times as great as that of zineb. Carbatene-Cu mixtures had a distinctly synergistic effect at corresponding concs. Against *P. viticola* on detached vine leaves the fungicidal effect of carbatene and of a mixture of it with Cu compounds was confirmed; in the field 12% of carbatene–63·2% tetracupric oxychloride was fully as effective as 2% Bordeaux mixture. Mixtures of organic products and Cu had a greater persistence than the organic product alone.

Brown (I. F.) & Sisler (H. D.). **Mechanisms of fungitoxic action of N-dodecylguanidine acetate.**—*Phytopathology*, **50**, 11, pp. 830–839, 6 graphs, 1960. [19 ref.]

At Univ. Md, College Park, the most toxic to *Saccharomyces pastorianus* and *Monilinia* [*Sclerotinia*] *fructicola* of a series of *n*-alkyl guanidine acetate compounds were those with 13–14 C atoms on the alkyl groups; the 10 C homologue was the most phytotoxic to *Nicotiana glutinosa*. Toxicity of dodine [**39**, 479] to *Saccharomyces pastorianus* increased from pH 5·1 to 7·8, the fungicide being rapidly accumulated by the cells. Inhibition of glucose oxidation in the yeast was correlated with inhibition of growth but with conidia of *Sclerotinia fructicola* there was no such correlation, germination being much more sensitive than oxidation. Yeast cells which failed to ferment pyruvate under anaerobic conditions did so following treatment with dodine. Both the yeast and *S. fructicola* lost P compounds and ninhydrin-positive substances after toxic doses of dodine. Dodine is considered to act on the yeast by altering cell permeability, with the loss of vital constituents, and by inactivating certain vital enzymes, and on conidia of *S. fructicola* by blocking anionic sites at the cell surface and inactivating enzymes.

Van Diepen (J. R.). **Bioassay of the systemic activity of cycloheximide semicarbazone in Cucumber plants.**—*Phytopathology*, **50**, 11, pp. 795–797, 1960.

Actidione semicarbazide in various parts of treated cucumber plants was bioassayed at Ohio State Univ., Columbus, by adding tissue extracts to Bacto-agar–2% dextrose and inoculating with *Pythium ultimum* isolated from diseased cucumber. The fungus is very sensitive to low concs. Conc. was higher in stem and leaves than in the roots and lowest in the hypocotyl, regardless of the site of application. Stem and leaf extracts were more inhibitory to the activity of the antibiotic against the fungus than were those from root or hypocotyl.

Somers (E.) & Richmond (D. V.). **The determination of captan in plant extracts.**—*Analyst*, **85**, 1011, pp. 440–442, 1 graph, 1960.

At Long Ashton Res. Sta., Bristol, the method of Burchfield and Schechtman [**38**, 181], based on the reaction of captan with pyridine and tetraethylammonium hydroxide to form a coloured complex, has been found suitable for the determination of the fungicide in spray residues [cf. **37**, 518; **39**, 543 and below], since it is not susceptible to interference from plant extracts (apple and strawberry fruits and apple, broad bean, and potato leaves) or other spray chemicals likely to be present on the plant surface. Certain refinements in technique are suggested.

Chancogne (Mlle M.) & Nakamura (H.). **Méthode biologique de dosage des résidus de captane.** [A biological method for the assay of captan residues.]—*Phytiatrie-Phytopharm.*, **9**, 1, pp. 3–6, 1960.

In a method devised at Inst. nat. Rech. agron., Versailles, cellulose filter disks 9 mm. diam. soaked in suspensions of captan (50% WP; dilutions of 0·1 ml.), then kept for 5 min. on filter paper, are placed on agar plates (90 mm. diam.) previously covered with a spore suspension of *Glomerella cingulata* in agar and incubated at

25° C. for 48 hr. The fungus has then darkened the medium except in a circular zone round the impregnated disks. The relationship between the diam. of the inhibition zone as a function of the log. conc. captan is linear and permits the determination of any quantity of captan from 1·25–20 μg [cf. above]. The technique is applicable to disks of leaves treated with fungicides.

THOMPSON (B. D.). **Post-harvest treatments of Strawberries and Radishes with cobalt-60 irradiation.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 110–112, 1960.

At Fla agric. Exp. Sta., Gainesville, decay in strawberries (mostly *Rhizopus*) under good storage conditions was controlled by 258,000 r. [cf. **38**, 704], a dose which had no effect on pH, titratable acidity, soluble solids, or flavour. There was some fruit damage after treatment with 322,000 r. Black spotting of radishes [**35**, 256] was controlled by 17,200 r. but the flavour was destroyed. This discoloration is best controlled by attention to careful marketing procedures.

BETTO (E.). **Esame dell' efficacia battericida e fungicida dell' ossido di etilene in autoclave sotto vuoto.** [An investigation of the bactericidal and fungicidal efficacy of ethylene oxide in an autoclave under vacuum.]—*Notiz. Malatt. Piante* 52 (N.S. 31), pp. 104–118, 1960. [Engl. summ.]

In vacuum fumigation tests (*Amer. J. Hyg.*, **50**, 1949) at Univ. Milan, Italy, using industrial equipment, on 10 micro-organisms in culture tubes and on paper, gas T (10% ethylene oxide, 90% CO_2), 550 g./cu. m., 2 hr. exposure at 18° C. prevented further growth of *Penicillium digitatum*; ethylene oxide [**35**, 470], 140 g./cu. m., 3 hr., at 24° was effective against *Aspergillus niger*, *Mucor racemosus*, and *Endothia parasitica*, and at 600 g./cu.m., 2 hr., 12° against *Actinomyces* [*Streptomyces*] *griseus*.

CLARK (N. G.), HAMS (A. F.), HIGGONS (D. J.), & STEVENSON (H. A.). **A new fungicide active against Botrytis spp.**—*Chem. & Ind.* (*Rev.*), *1960*, 21, pp. 572–573, 1960.

Particulars are given of the biological and chemical properties of 2,6-dichloro-4 nitroaniline and of the results obtained in field trials in which it was applied against *Botrytis cinerea* on lettuce [**39**, 544] at Boots Pure Drug Co., Lenton Exp. Sta., Nottingham. This well-known dyestuffs intermediate is chemically compatible with all fungicides and insecticides, virtually insoluble in water and sparingly soluble in most organic solvents, and almost non-volatile. The commercial form is a practically non-odorous powder containing a min. of 90% of the active isomer. Deposits on foliage and in the soil appear to be very persistent. In *in vitro* tests on 20 soil pathogens it was almost specific to *B.* spp.

The best control of grey mould was obtained by dusting the soil before and occasionally after planting at a conc. of 4%. The survivals in 1957–8 and 1958–9 of crops treated in this way were 99 and 90%, respectively, and the marketable products in Mar. 1958 and 1959, 94 and 89%, respectively; corresponding figures for 5% tecnazene were 93 and 83 and 50 and 77; for 10% thiram 88 and 93, 74 and 91; and untreated 68 and 61, 34 and 47.

KOCH (H.). **Anerkannte Pflanzenschutzgeräte und -geräteteile.** [Approved plant protection equipment and component parts.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 10, pp. 145–151, 12 fig., 4 graphs, 1960.

On the same lines as before [cf. **39**, 381].

Initial results in the assessment of the effectiveness of Chinese plant substances for the control of several plant diseases.—*Kexue Tongbao* (*Scientia*), *1959*, 2, p. 60, 1959. [Chinese.]

Of 312 plant extracts tested at the Inst. Microbiol., Chinese Acad. Sci., [Pekin],

10, including that from *Carpesium abrotanoides*, gave up to 90–100% control of wheat rusts [*Puccinia* spp.]. Upwards of 80% control of *Phytophthora infestans* [on potato] was obtained with 20 extracts, the most effective being from *Orixa japonica* and *Lycoris radicata*. That from *O. japonica* was subjected to 4 tests and gave results similar to those achieved with the usual Cu sulphate preparations. *L. radicata* extract is also very promising as a substitute for Cu sulphate against *P. infestans*. Yellow wilt of cotton [unspecified] was also considerably reduced by *Acanthopanax gracilistylus*, extracts from which were especially effective against wheat rusts and stimulated the growth of wheat and maize seedlings.

Bel'tyukova (Mme K. G.) & Pastushenko (L. T.). Про дію кансатину 2 (з Конопель) на фітопатогенні бактерії та деякі рослини. [On the effect of kansatin 2 (from Hemp) on phytopathogenic bacteria and certain plants.]—*J. Microbiol., Kiev*, **22**, 4, pp. 1–6, 1 fig., 1960. [Russ. summ.]

Kansatin 2, a hemp extract, was found at Inst. Microbiol., Acad. Sci. Ukraine, to be effective against *Corynebacterium michiganense* [cf. **39**, 351] on tomato and *C. sepedonicum* [cf. **38**, 31] on potato. Pre-sowing treatment of tomato seed increased germination, numbers of young fruit, and yield by 17, 14, and 33%, respectively. Some diseases treated with kansatin were increased. Pre-sowing treatment of potato tubers gave a field increase in germination and yield according to var., and some diseases were depressed, including nematode diseases. Also susceptible to the phytoncide were *C. flaccumfaciens* and *C. insidiosum*.

Goodman (R. N.) & Goldberg (H. S.). **The influence of cation competition, time, and temperature on the uptake of streptomycin by foliage.**—*Phytopathology*, **50**, 11, pp. 851–854, 1960. [22 ref.]

At Dept Hort., Univ. Mo., Columbia, competition was demonstrated between K, Na, Mn, Ca, Al, and other metallic cations, as chlorides, on the one hand and the organic cation streptomycin on the other for adsorption sites in homogenized leaves of apple, *Coleus*, and other plants. Excised leaves of bean [*Phaseolus*: **37**, 618] and *Coleus* absorbed more streptomycin from a water agar mixture through the lower surfaces than through the upper, and apple leaves more through the upper. The quantity depended also on time and temp. Temp. coefficients for streptomycin absorption by bean and apple suggest that the mechanism is metabolically controlled.

Davis (D.), Chaiet (L.), Rothrock (J. W.), Deak (J.), Halmos (S.), & Garber (J. D.). **Chemotherapy of cereal rusts with a new antibiotic.**—*Phytopathology*, **50**, 11, pp. 841–843, 1 diag., 1960.

At Merck Sharp & Dohme Res. Labs., Rahway, N.J., antibiotic P-9 from *Streptomyces* sp. inhibited the development of *Puccinia rubigo-vera* f.sp. *tritici* [*P. recondita*] race 9, *P. graminis* f.sp. *tritici* race 15B, and *Erysiphe graminis* on wheat, *P. coronata* var. *avenae* race 80 on oats, and *E. polygoni* on bean [*Phaseolus vulgaris*] when the plants were sprayed 2 days after inoculation. The antibiotic is non-phytotoxic, highly potent (at least 30 times as active as actidione [**37**, 468; **39**, 403] against *P. recondita*), fast-acting, persistent, and translocatable.

Gottlieb (D.) & Pote (H. L.). **Tetrin, an antifungal antibiotic.**—*Phytopathology*, **50**, 11, pp. 817–822, 2 graphs, 1960.

At Ill. Univ., Urbana, *Streptomyces* sp. (Ill. No. 155–2) produced a polyene, tetrin, with the empirical formula $C_{31}H_{59}O_{12}N$. It is soluble in water, methanol, ethanol, dimethyl formamide, pyridine, and methyl cellosolve, is stable at neutral and alkaline pH but not acid, and is unaffected by 1 hr. at 100° C. Sprayed on the leaves at 250–1,000 μg./ml., it was non-toxic to tomato, beet, pea, radish, broccoli, and

soybean and in preliminary experiments reduced infection by *Cercospora sojina* on soybean.

BREWER (D.). **Studies on slime accumulations in pulp and paper mills. IV. Fungal floras of slime accumulations.**—*T.A.P.P.I.*, **43**, 7, pp. 609–611, 1960.

Further studies [**39**, 6] showed that at given locations in mills in N.B., Canada, the fungal spp. may vary from one sampling to another, sometimes irrespective of differences in temp. or in the particular fungicide used. For instance, in June 1956 the slime in samples of the groundwood system of a mill kept at 15° C. yielded *Cephalosporium* sp. and *Phialophora* spp., including *P. fastigiata*, while in Nov. 1957 at 21° *Nodulisporium* sp., *P. richardsiae*, *Rhinocladiella atrovirens*, and *Torula chartarum* were isolated from the same material. A change of fungicide shortly after this date resulted in the transformation of the slime from a dark, mottled paste to a 'tapioca-like' type, due to almost complete coverage by a very fast-growing *Geotrichum* sp. and the total elimination of the formerly predominant *R. atrovirens*. In Oct. 1958 with a different fungicide the fungi detected at 15° were *P.* sp., *P. lignicola*, *P. richardsiae*, and *R. atrovirens*.

Examples of the fungi associated with the kraft system, the sulphite flat screens, and the secondary centri-cleaner under stated temp. conditions at different seasons with and without fungicide are given.

CONKEY (J. H.) & CARLSON (J. A.). **Relative toxicity of biostatic agents suggested for use in the pulp and paper industry—1958 review.**

CONKEY (J. H.) & CARLSON (J. A.). **Relative toxicity of biostatic agents suggested for the pulp and paper industry—1959 supplement.**—*T.A.P.P.I.*, **43**, 10, pp. 12A, 14A, 16A, 18A, 22A, 24A, 26A, 28A; 40A, 42A, 1960.

Details are given of various modifications which have been introduced into the agar-Petri plate technique since the inception in 1941 of the programme for the assay of slime-control agents [**38**, 42]. Reviews are published at 5-yearly intervals [cf. **33**, 370], while current data are supplied annually in the form of supplements [2nd paper]. The total number of compounds tested to date for their toxicity, e.g. to *Aspergillus niger* and *Penicillium expansum*, is 192, of which 22 were investigated during the past year. Tables show the inhibiting concs., active ingredients, and sources of supply of all the chemicals.

The 2nd paper is a report covering a further 33 materials.

PRÉVOT (J.). **La microflore des jus tannants et des cuirs de tannage végétal.** [The microflora of tanning liquors and vegetable-tanned leathers.] —*Bull. Ass. franç. Chim. Cuir*, **21**, **(51)**, 5, pp. 116–122, 1959.

The results of recent studies at the Institut de Recherches pour les Industries du Cuir, 181–203, Avenue Jean Jaurès, Lyons, France (all published in this journal from 1954 to 59) are summarized. Of the 100 strs. of yeasts, representing 19 spp., isolated from a variety of sources and substrates, e.g. chestnut alone or with mimosa, quebracho + myrobolan, and oak bark, 5 proved harmful, viz. *Petasospora strasburgensis*, *P. rhodanensis*, *Pichia pseudopolymorpha*, *Candida guilliermondii*, and *C. humicola*.

Aspergillus flavus and *A. niger*, especially the former, are the most aggressive of the approx. 20 *A.* spp. occurring in tanneries, while damage is also attributable to 3 *Penicillium frequentans* group strs., *P. corylophylum*, and *Trichoderma viride*. For control, antifungal agents with a phenolic base [see below] are preferable to those based on quaternary NH_4 salts, which precipitate the tannins. Since the moulds become adapted to the antiseptics, the latter should be alternated annually. Moreover, it should be remembered that the chemicals, at the dosages employed,

are merely fungistatic, so that leather from the tanning liquor will become mouldy under favourable conditions unless it is dried rapidly and treated.

Dahl (S.) & Kaplan (A. M.). **4-nitrophenyl esters, including mixed carbonates and bis carbonates, as leather fungicides.**—*J. Amer. Leath. Chem. Ass.*, **55**, 9, pp. 480–500, 1 diag., 1960.

In further studies at the Nat. Bureau of Standards, Washington, D.C., all the compounds proved to be toxic to *Aspergillus niger* [see above], the common operative substance being free nitrophenol liberated by hydrolysis [**39**, 383]. Although the rate of this process in aqueous *p*-dioxane at pH 3 and 40° C. varied 7,000-fold, the differences in fungicidal efficiency were unimportant. At 5 milli equiv. (as nitrophenol)/100 g. leather, 9 of 10 compounds produced 100% inhibition of mildew on samples exposed in a tropical room. Derivatives of 2-chloro-4-nitrophenol were more potent than those of 4-nitrophenol, corresponding exactly to the difference in this respect between the parent compounds. The non-carbonate esters and mixed carbonates, like the bis-carbonates, are colourless, less water-soluble than the free nitrophenols, and probably non-poisonous.

Webb (B. D.), Bayliss (Mary E.), & Richardson (L. R.). **Relation of interspace relative humidity to growth of molds and heating in feed ingredients and feed mixtures.**—*J. agric. Fd Chem.*, **8**, 5, pp. 371–374, 1 diag., 1 graph, 1960.

At Tex. agric. Exp. Sta., Coll. Sta., the relationship was determined at 10°, 21°, and 32° C. in samples of ground maize and milo [sorghum] and soybean oil, cottonseed, milk gluten, dehydrated lucerne leaf, and steamed bone meals, and in a mixture of some of these with or without supplements of maize or fish solubles or animal feeding fat.

None of the ingredients or mixtures investigated developed mould infection or spontaneous heating over a 6-week period at or below R.H. 72%, which has consequently been taken to represent the critical level for these forms of deterioration. Safe R.H. was less variable than safe moisture content, 7·8–13·9% in these studies, and the former is therefore recommended as a measure of reliability in storage conditions.

Plant quarantine announcements.—*F.A.O. Plant Prot. Bull.*, **8**, 10, pp. 125–126; 11, pp. 137–140, 1960.

Guatemala. An executive order of 2 Dec. 1959, published in *El Guatemalteco*, **157**, 86, 19 Dec. 1959, prohibits the importation of seed or plant parts of cacao or rubber except by the Nat. Inst. Agric. & Livestock.

Netherlands New Guinea. The Executive Regulations Plant Quarantine Ordinance of Decree EZ 59–98, 17 Oct. 1959 [**39**, 670], is amended as regards the American Tropics by Amendment Decree No. EZ 60–50 of 28 April, 1960.

Pakistan. Statutory Notification S.R.O. 128 (K), 10 Feb. 1960, published in *Gaz. Pakistan*, **8**, 19 Feb. 1960, amends the potato import regulations, Notification No. F. 320/35A of 20 July 1936.

Venezuela. Resolution No. 4, 20 Dec. 1948 is revoked by Resolution Ag 29, 10 Feb. 1960, in *Gac. Ofic.*, **88**, 26181, 11 Feb. 1960, which regulates the importation of living plant material.

Greece. The decree of 18 Dec. 1954 concerning the import of plants and their products is revoked by the decree of 19 Feb. 1959 (*Ephemeris tes Kuberneseos* 42, 6 Mar. 1959). Details are given and the chief pests and diseases from which imported materials must be free are listed.

Pflanzenschutzbestimmungen in Deutschland. Pflanzenschutzbestimmungen im Ausland. [Plant protection regulations in Germany. Plant protection regula-

tions abroad.]—*Amtl. PflSchBestimm.* N.F., **14**, 3, pp. 18–143, 144–162, 1960.

This publication follows the usual lines [cf. **40**, 207].

Bailey (D. L.). **The organization and development of plant pathology in Canada.**—*Proc. Canad. phytopath. Soc.*, **27**, pp. 23–28, 1960.

A condensed version of a paper presented to the 9th International bot. Congress, Montreal, 1959, in which progress in plant pathological work in Canada from its inception in the 1st decade of this century was outlined. The contributions of the Government-sponsored laboratories and the universities to plant pathology were briefly noted and compared.

Miller (P. R.). **New techniques for plant disease surveys and for appraisal of losses.**—*Plant Dis. Reptr*, **44**, 1, pp. 5–11, 1960.

In this review studies connected with the estimation of plant disease losses, most of which have been noticed, are examined under 3 heads; advances in survey methods [cf. **36**, 387]; fundamental investigations on the spread of pathogens; and assessment of plant disease importance, including loss analysis and sampling methods. The 20 ref. on which the review is based are supplemented by 44 annotated ref.

Rodina (Mme A. G.). Дрожжевые грибки в рыбоводных прудах и их пищевое значение. [Yeast fungi in fish breeding ponds and their nutritive importance.]—*Bull. Acad. Sci. U.R.S.S.*, **25**, 5, pp. 661–669, 1 fig., 2 graphs, 1960. [Engl. summ.]

The yeasts studied at the zool. Inst., Acad. Sci. U.S.S.R., were from fish ponds in the N. Caucasus and the Latvian S.S.R. Identification proved difficult in the absence of keys for pond yeasts. Strains frequently differed in some character from the types, but not so much as to justify attributing them to new spp. In all, 10 spp. of *Torulopsis*, 7 of *Rhodotorula*, and 1 of *Sporobolomyces* were isolated. Black yeast forms from ponds were similar to those from lakes, *Nadsoniella nigra* being frequently obtained. Yeasts are one of the foods of planktonic crustacea and vary in quantity during the growing period and in relation to the fertility of the pond. The sharpest increase occurred in the vegetation zone and with complex fertilizers when the phytoplankton began to develop. Yeast development is connected with the organic compound content, one of the sources of which are algae.

Bohus (G.) & Babos (M.). **Coenology of terricolous macroscopic fungi of deciduous forests. Contributions to our knowledge of their behaviour in Hungary.**—*Bot. Jb.*, **80**, 1, pp. 1–100, 1 fig., 1 graph, 1 map, 1960. [54 ref.]

In this detailed analysis of larger fungi occurring in different forest biocoenoses, material collected from 1948 onwards was studied, the results of which are fully tabulated. The relations of the mycocoenoses with forest plant associations, tree metabolism, and soil characteristics are discussed.

Акнромеїко (A. I.). Новые данные о роли микоризы в питании древесных растений. [New data on the role of mycorrhiza in the nutrition of woody plants.]—Лес. Хоз. [*Les. Khoz.*], **12**, 10, pp. 27–31, 5 graphs, 1960.

In sand-culture experiments (in collaboration with Mme M. V. Zhuravleva) in 1958 *Boletus granulatus* [cf. **40**, 67] was introduced into vessels before pine seeds were sown, and *Hebeloma crustuliniforme* before oak. Pine without mycorrhiza were grown from seed treated with 0·5% solution of K permanganate, and oak without mycorrhiza from acorns treated with a 1% calcium hypochlorite. At the beginning of Sept. mycorrhiza were present on pine and oak given the fungi but not on those without. At the end of Sept. the seedlings were washed and transferred to a

solution with radio-active P (1 mc/ml.) for 1–60 min. The seedlings without mycorrhiza accumulated in 1–60 min. considerably more radio-active P than those with mycorrhiza. A further experiment showed that mycorrhiza of pine and especially oak seedlings assimilated much more P in 1 min. and transferred much less to neighbouring plants than non-mycorrhizal. Secretion of P by the roots of oak seedlings at night occurred only in the non-mycorrhizal. In those with mycorrhiza a reduction of P assimilation was noted. *Lactarius rufus* growing 25 cm. away from birch transferred in 1 hr. 200 imp./min./g. of P^{32}, the quantity increasing constantly up to 24 hr. *B. versipellis*, *Russula fragilis*, and other fungi at 5–7 cm. from pine, ivy, strawberry, and raspberry transferred a very large quantity of P^{32} in 24 hr. P transfer by fungi to plants may be due to isotope exchange and also to the partial necrosis of the mycorrhizal cover. In the same natural conditions a significantly large transfer of radio-active P occurred in the autumn from oak and pine to fungi. Much more P^{32} was found in the caps than in the stipes. From these experiments it appears that viable mycorrhiza only weaken the absorption of water and assimilation of nutrient mineral salts by woody plants. If the mycorrhiza dies, the nutrient substances accumulated by it and by the rhizosphere bacteria, first by autolysis and then as the result of mineralization, contribute to the good growth and development of the plant.

PRIDHAM (J. B.) (Editor). **Phenolics in plants in health and disease.** –ix+131 pp., 1 col. pl., 20 fig., 11 graphs, Oxford, London, N.Y., Paris, Pergamon Press, 1960. 42*s*.

This book comprises the proceedings of a Plant Phenolics Group Symposium, held at Bristol Univ., 2–3 Apr., 1959. Session I was devoted to general aspects including distribution and inhibitory action, II to lignification, III (pp. 75–105) to pathology (5 papers), and IV to genetics. Each paper is followed by refs. and discussion.

D. WOODCOCK (Long Ashton Res. Sta., Bristol). **The metabolism of aromatic compounds by fungi** (pp. 75–79), summarizes studies on the detoxication of fungus toxins by hydroxylation [**39**, 380].

A. E. FLOOD & D. S. KIRKHAM (East Malling Res. Sta.). **The effect of some phenolic compounds on the growth and sporulation of two Venturia spp.** (pp. 81–85) [**37**, 89].

A. C. HULME & K. L. EDNEY (Ditton Laboratory, D.S.I.R.). **Phenolic substances in the peel of Cox's Orange Pippin Apples with reference to infection by G. perennans** (pp. 87–94), describes recent work which indicates that changes in susceptibility to *G. perennans* [*Pezicula malicorticis*] in detached Cox's fruits [**38**, 265] are not accompanied by a significant change in gross phenolic content. No extracts so far obtained from apples have had any marked effect on the germination of conidia at a pH where H ion conc. alone has no effect. Chlorogenic acid inhibits or modifies the germination of *G. perennans* in culture; in both fruit on the tree and in storage there is a parallelism between increased susceptibility and a decrease in chlorogenic acid in the peel.

R. J. W. BYRDE, A. H. FIELDING, & A. H. WILLIAMS (Long Ashton Res. Sta., Bristol). **The role of oxidized polyphenols in the varietal resistance of apples to brown rot** (pp. 95–99), sums up recent advances in this aspect of brown rot (*Sclerotinia fructigena*) [**37**, 241].

C. H. CADMAN (Scottish hort. Res. Inst., Invergowrie). **Inhibition of plant virus infection by tannins** (pp. 101–105), presents information on this subject previously reported [**38**, 532].

ENGELBRECHT (L.) & MOTHES (K.). **Kinetin als Faktor der Hitzeresistenz.** [Kinetin as a factor of heat resistance.]—*Ber. dtsch. bot. Ges.*, **73**, 7, pp. 246–257, 7 fig., 2 graphs, 1960.

When leaves of *Nicotiana rustica* were sprayed with kinetin (6-aminofurfuryl-

purine) at the Inst. für Biochemie der Pflanzen, Halle (Saale), they became more heat resistant. Kinetin raises the amino acid content in the heated part of the leaf, thereby maintaining or even raising the protein level.

Wood (R. K. S.). **Pectic and cellulolytic enzymes in plant disease.**—*Ann. Rev. Pl. Physiol.*, **11**, pp. 299–322, 1960. [149 ref.]

The author (Imperial Coll. Sci., London), after briefly describing the structure of the cell wall and the nature and distribution of pectic substances and cellulose, develops the theme that although much work has been done on the production of pectic and cellulolytic enzymes *in vitro* by plant pathogens, few attempts have been made to study enzyme production *in vivo*, and clearly future investigations should take into account both the types and effects of enzymes produced at cell level, particularly in their action on young cell walls.

Bulit (J.) & Louvet (J.). **Une technique d'étude de l'action du gaz carbonique sur les champignons parasites des organes végétaux souterrains.** [A technique for the study of the action of CO_2 on fungi parasitic on underground plant organs.] —*Ann. Inst. Pasteur*, **98**, 4, pp. 557–561, 1 graph, 1960. [Engl. summ.]

In these experiments at the Station de Pathologie Végétale, Centre de Recherches Agronomiques, Versailles, humidified air—CO_2 was circulated at approx. 6 l./hr. through Al Roux boxes in which the fungi (*Sclerotinia minor* from lettuce roots and *Fusarium oxysporum* from melon roots) were grown on expanded perlite saturated with a nutrient solution at 20° C.

The growth of the former decreased rapidly with a rising conc. of CO_2, whereas the dry mycelial wt. of the latter was consistently higher in 100% CO_2 than in normal air, the reaction of the fungus hardly varying within the range of 1·7–23·5% CO_2 [cf. **33**, 49].

Strider (D. L.) & Winstead (N. N.). **Toxicity of acetic acid to Cladosporium cucumerinum.**—*Phytopathology*, **50**, 11, pp. 781–784, 1960.

Most of the results of these studies have been noticed [**39**, 764; **40**, 139]. Other fungi inhibited by acetic acid at low pH values were *Fusarium oxysporum* f. [*F. bulbigenum* var.] *batatas*, *Pythium aphanidermatum*, *Pellicularia filamentosa* [*Corticium solani*], *Aspergillus flavus*, and *Colletotrichum lagenarium* race 1.

Grosclaude (C.). **Sur le rôle antagoniste de Cytospora leucostoma. L'antagonisme C. leucostoma-Stereum purpureum in vitro.** [On the antagonism of *Valsa leucostoma*. The antagonism between *V. leucostoma* and *S. purpureum in vitro*.]—*Bull. Soc. mycol. Fr.*, **76**, 2, pp. 163–170, 1 fig., 1960.

In culture a sp. resembling *V. leucostoma* [**38**, 352] isolated from pruning wounds on apparently healthy branches of peach trees near Bordeaux and *S. purpureum* exerted an antagonistic effect upon each other, *S. purpureum* being the more susceptible to this effect. Filtrates from mixed cultures were more toxic to spores of each fungus and of *Monilia* [*Sclerotinia*] *cinerea* than were filtrates of either fungus separately. The toxic principles were thermostable and extractable with ether, though those of the separate parent culture filtrates were not.

Mishustin (E. N.) & Pushkinskaya (Mme O. I.). Эколого-географические закономерности в распространении почвенных микроскопических грибов. [Ecological and geographical factors governing the distribution of microscopic soil fungi.] —*Bull. Acad. Sci. U.R.S.S.*, **25**, 5, pp. 641–660, 1960. [2 pp. ref. Engl. summ.]

An analysis is given from Inst. Microbiol., Acad. Sci. U.S.S.R., of bibliographical and original data on soil microfloras of different climatic zones, especially from the point of view of generic composition. Individual representatives of the soil microflora

have different N and C requirements, O regime, temp. conditions etc., and its composition, therefore, adjusts itself to ecological and geographical variations of these factors. Plant cover and climate are decisive factors in determining its character. The combination of natural factors producing zonal soil types has brought about the formation in them of characteristic coenoses of microscopic fungi. Individual factors such as weather, the character of the higher plants etc. influence the composition without obliterating its characteristic features. The microflora of each soil type is sufficiently specific. For example, in the soils of the southern zone the Penicillia decline and the Aspergilla increase. Some sect. of *Penicillium* are adapted to specific soil types: representatives of the Biverticillata multiply mainly in forest soils, while the Monoverticillata do so in soils of the southern zone with unfavourable agricultural features. Mucors and yeasts flourish in soils rich in recent plant remains, and are more widespread in soils of the northern zone. *Fusarium* spp. are more richly represented in soils of the southern zone with grass cover. The ecology and geography of micro-organisms, including soil fungi, are determined on the basis of their physiological characters, so that the character of the substratum can be adequately assessed on the basis of mycological studies.

Watson (R. D.). **Soil washing improves the value of the soil dilution and the plate count method of estimating populations of soil fungi.**—*Phytopathology*, **50**, 11, pp. 792–794, 6 graphs, 1960.

At Dept Plant Path., Univ. Idaho agric. Exp. Sta., Moscow, a higher percentage of soil-borne pathogens and more genera of soil fungi developed on plates prepared from washed soil (1 g. equivalent air-dry soil shaken with 200 ml. water, allowed to settle 1 min. and the water decanted; repeated up to 32 times) than on plates from unwashed soil. Washing removes excess loose spores of *Penicillium* and *Aspergillus* spp. and thus helps to produce a more realistic picture of the soil microflora. In samples from onion fields infested with root- and bulb-rotting *Fusarium* spp. the no. of *F.* spp. recorded from the washed series was in better agreement with rot incidence than those from the unwashed.

Lockwood (J. L.). **Lysis of mycelium of plant-pathogenic fungi by natural soil.**—*Phytopathology*, **50**, 11, pp. 787–789, 1960.

When living or dead 4-day-old cultures of 20 plant-pathogenic fungi were covered with field soil for 1–2 weeks at Mich. agric. Exp. Sta. [cf. **38**. 673] the mycelium was almost completely destroyed. Peptone agar cultures killed by propylene oxide were lysed more completely than those on Czapek's medium. There was no difference in the amount of lysis of root-infecting and non-root-infecting fungi.

Campbell (L.) & Courtney (W. D.). **Effect of high-temperature water vapour on soil organisms.**—*Plant Dis. Reptr*, **44**, 10, pp. 804–805, 1960.

At Western Wash. Exp. Sta. and U.S. Dept Agric., Puyallup, treatment with a laboratory model of an 'ironovator', which scoops up soil, pulverises it, and subjects it to super-heated water vapour at 800–850° F., caused 100% reduction of *Fusarium* sp. on beans [*Phaseolus vulgaris*], 64% of *Sclerotinia* [*sclerotiorum*] on beans, and 94% of onion smut [*Urocystis cepulae*] in comparison with untreated soil sown with the same seed lot. Results obtained with a field-scale 'ironovator', constructed by the Skagit Steel and Iron Works, Sedro Woolley, Wash., were 62·5% reduction of bean root rot but no reduction of onion smut. Killing is by instantaneous absorption of heat by the organisms, the soil temp. not being raised significantly, but effectiveness seems to depend on the amount of soil passing.

Index of Fungi.—Kew, Commonwealth Mycological Institute. 10*s*. per annum, post free, payable in advance.

The latest number (vol. **3**, part 1, 30 pp., 1961) of this half-yearly periodical which

lists, with places of publication, names of new gen., spp., and vars. of fungi, new combinations, and new names, marks the beginning of the next 10-yr. vol. Henceforth it will be issued in Jan. and July. A cumulative index to vol. **2** (1950–60) is in preparation.

Bibliography of Systematic Mycology, 1961, Part 1.—28 pp. Kew, Commonwealth Mycological Institute, 1961. 7*s.* 6*d.* per annum, post free, payable in advance.

This periodical will henceforth be issued half-yearly, in Jan. and July. Each part lists, by title, papers on all aspects of the taxonomy of fungi, including those abstracted in this *Review*, noticed by this Institute during a 6-month period. The items are arranged under the headings: general, taxonomic principles and nomenclature, obituaries, regional and ecological lists (which include lists of plant diseases), culture collections, actinomycetes, and those of the main classes and orders of fungi.

British Commonwealth Collections of micro-organisms. Directory of collections and list of species maintained in Australia ; . . . in Canada ; . . . in India ; . . . in New Zealand ; . . . in United Kingdom, Ghana, and Trinidad.—v + 45 pp. (8*s.*); iv+48 pp. (9*s.*); iv+36 pp. (6*s.*); iv+16 pp. (3*s.*); iv+70 pp. (12*s.* 6*d.*), London H.M. Stationery Office, 1960.

All these lists are compiled on similar lines [cf. **36**, 500]. Each contains a list of the names and addresses of culture collections followed by alphabetical lists of algae and protozoa, bacteria, fungi, viruses and bacterophages, and yeasts with references to the collections where they are maintained. Many plant pathogens are listed.

Khinkova (Tsvetana). Паразитни гъби по растителността в Източна Рила. [Parasitic fungi of the plants in Eastern Rila.]—120 pp., 5 graphs, Sofia, Bulgarian Academy of Sciences, 1959. 6.40 lv. [Russ., Engl. summ. 59 ref.]

A condensed monograph, which begins with a review of previous studies, an outline of geographical and geological conditions and climate, characteristics of the flora, a systematic survey of the genera of fungi, their distribution according to altitude and habitat, and the phenology of spp. observed in recent years. Thereafter an annotated compilation of the fungi, arranged systematically, is followed by a host-parasite index, listed under the host families. Particular attention, with relevant data, is paid to the occurrence of the fungi in relation to altitude and season.

Annaliev (S. A.). Новые виды грибов, найденные в Туркменистане. [New species of fungi found in Turkmenistan.] Вестн. Москов. Унив. [*Vestn. Moskov. Univ.*], Ser. biol., **15**, 4, pp. 54–60, 8 fig., 1960.

Six new spp. and 1 new f.sp. of various taxonomic groups are described from the Kara-Kalinskiĭ area, Turkmen S.S.R.

Chambers (S. C.). **Diseases recorded on cereals, grasses and pasture legumes in Western Australia.**—*J. Agric. W. Aust.*, 1 (4th ser.), 10, pp. 927–934, 1960.

In this new list [cf. **7**, 673] all subsequent records to the end of 1959 are included. The pathogens and non-pathogenic disorders, with the common names, are listed under hosts, together with the localities and dates of each record.

Fergus (C. L.) & Kern (F. D.). **A list of fungi found on trees in Pennsylvania.**—*Bull. Pa agric. Exp. Sta.* 646, 38 pp., 1959.

Some 2,500 fungi are listed under 150 tree hosts of 58 gen. from collections deposited in Pa State Univ. Herbarium, the Herbarium of L.O. Overholts, or from cultures in Pa State Univ. Culture Collection. The list excludes Myxomycetes, Gasteromycetes, Clavariaceae, and most of the Agaricaceae.

Dennis (R. W. G.). **British cup fungi and their allies.**—xxiv+280+20 (unnumbered) pp., 40 col. pl. (474 fig.), 20 fig., London, The Ray Society, Vol. 143, 1960. 80*s*.

This 'introduction to the study of the Ascomycetes' (Euascomycetes and Loculoascomycetes) begins with brief notes on structure and classification, a key to the orders of larger ascomycetes, a discussion on taxonomy and nomenclature, notes on fields of work suitable for amateurs and the economic importance of the group, and an annotated list of reference books. The major part of the book (pp. 1–280) is devoted to descriptions of the gen. and spp. of 59 families with keys to the families and gen., and notes on habitats, distribution, etc. The work is profusely illustrated from collections in the Herbarium of the Royal Botanic Gardens, Kew.

Kochman (J.). **Przyczynek do znajomości flory głowni polskich. III.** [A contribution to the knowledge of Polish smut fungi. III.] —*Acta Soc. Bot. Polon.*, **29**, 3, pp. 413–430, 2 fig., 1960. [Engl. summ.]

Included in this complete list of Ustilaginales recorded in Poland [cf. **18**, 552] is the new European record of *Entyloma compositarum* on *Gaillardia aristata* and *G. pulchella*, probably introduced with the host from America.

Teakle (D. S.). **Species of Pythium in Queensland.**—*Qd J. agric. Sci.*, **17**, 1, pp. 15–31, 4 fig., 1960. [13 ref.]

Notes are given on the morphological and cultural characters of 14 *Pythium* spp. so far recorded in Queensland, mostly on hosts of economic importance, together with an annotated host index. Max. temp. data from growth-temp. studies proved an aid to morphology in identification [cf. **22**, 373]. New records for Queensland include *P. debaryanum* [map 208] on 14 hosts, *P. irregulare* [206] on 7, and *P. vexans* [205] on 5.

Rasulev (U. U.). Об изменчивости и таксономическом положении некоторых форм грибов р. **Rhizoctonia.** [On variability and the taxonomic position of some forms of fungi of the genus *Rhizoctonia*.]—Узбек. биол. Ж. [*Uzbek. biol. Zh.*], *1959*, 5, pp. 21–30, 2 fig., 1959. [Uzbek summ.]

Comparative studies at the sci. Res. Inst. Plant Prot. of the cultural properties, morphology, specialization, pleomorphism, and other features of variability were made during an investigation of the mycoflora of the Volosovo district, Leningrad region in 1954–56. It is thought that one of the sources of black stem [*Moniliopsis aderholdii*: **38**, 401] in cabbage may be the peat used in seed beds and in the preparation of peat-humus pots, which contains hyphae of the fungus. The morphological and cultural characters of *Rhizoctonia* sp. from peat differed sharply from those of *R.* [*M.*] *aderholdii* and *R.* [*Corticium*] *solani* [cf. **39**, 338, 493], but after a single passage through cabbage, it assumed the characters of *M. aderholdii*. Similarly after a single passage through potato *M. aderholdii* assumed the characters of *C. solani*. *C. solani* after a single passage through cabbage developed those of *M. aderholdii*. Humid conditions and a living host are needed for the formation of the basidial state. Conidia develop in the soil and in a damp chamber when humidity is sufficient. *M. aderholdii*, *C. solani*, and *R.* sp. from peat and conidial fungi like those of *Pellicularia* do not seem to be independent species, but only forms or substrate modifications of the single species *C. solani*. The forms of *R.* with conidia must be attributed to *P.* [**22**, 372].

Osipyan (L. L.). Представители рода **Ramularia** в Армянской ССР [Representatives of the genus *Ramularia* in the Armenian S.S.R.]—*Nauch. Trud. erevansk. Univ.*, Ser. biol. Sci., **64**, 7, pp. 111–124, 1958. [Arm. summ.]

In this study based on the author's collection and specimens in the herbaria of the

Dept Plant Morphology and Systematics, Erevan State Univ., and the Dept Plant Protect., Armenian agric. Inst., 52 *Ramularia* spp. are recorded as occurring in Armenia, 41 being 1st records for the Republic. For each sp., hosts (22 fam.) and local distribution are given. *R. chicorii* infects both the leaves and stalks of chicory.

Beshkov (M. N.) & Tatarov (G. M.). Серологично проучване на захаромицетните гъби. [A serological study of Saccharomycetes.] **III.** Върху серологичните особености на **Sacch. chodati.** [On the serological properties of *S. chodati.*] **IV.** Серологично проучване на **Saccharomyces chevalieri.** [A serological study of *S. chevalieri.*] **V.** Серологична характеристика на **Saccharomyces paradoxus.** [Serological characteristics of *S. paradoxus.*]—Науч. Труд., Пловдив [*Nauch. Trud., Plovdiv*], **7**, pp. 251–257; 259–264; 265–270, 1960. [Russ., Fr. summ.]

A report from the Chair of Microbiol., Plovdiv, Bulgaria, on the acquisition of agglutinating sera by immunization of young rabbits with the strs. 93a, 326A, and 348A of the respective spp. Complete cross agglutinations of the saturated sera of the sp. concerned in each case and of some other *S.* spp. revealed the presence of 2 thermostable antigens (A, B) in *S. chodati* and *S. paradoxus*, and of 1 thermostable (A), present in most spp., and 2 thermolabile antigens (*c*) in *S. oviformis* and *S. ellipsoideus* and (*d*) in *S. chevalieri* and *S. ellipsoideus.*

Barer (R.). **A new micrometer microscope.**—*Nature, Lond.*, **188**, 4748, pp. 398–399, 1 fig., 1960.

An optical instrument similar to the Mach-Zehnder interferometer, constructed in the Dept Human Anatomy, Univ. Oxford, enables the shape and dimensions of an irregular object to be plotted in polar co-ordinates. The instrument may be used in conjunction with most methods of microscopy and be applied to living cells.

Joly (P.). **Sur les causes d'erreurs dans l'emploi de la méthode hématimétrique pour évaluer le taux de sporulation chez les champignons.** [On the causes of errors in the use of the haematometric method for calculating spore production of fungi.]—*Bull. Soc. mycol. Fr.*, **76**, 3, pp. 275–290, 1 fig., 1960.

The author discusses (with illustrative examples using 5 conidial fungi with different kinds of spores) the effect of shaking a culture to obtain a spore suspension in an extracting fluid, with the result that the surface of the culture is agitated more violently than the part below; the use, to correct the errors so arising, of dried, ground-up cultures; the results obtained when water only is used as the extracting fluid, in comparison with water + a material lowering the surface tension; the effect of the intensity of the shaking; and errors due to the haematometer itself, to the use of different pipettes instead of 1 only, and to the degree of dilution of the extracting fluid.

In most cases extractions should be made with a fluid having a low surface tension and from dried, ground-up cultures. If fresh cultures are used the morphological and biological characters of the spores may have to be considered. Finally, the proper amount of extracting fluid to use must be determined for each sp.

Leis (E.) & Ralph (B. J.). **A grinding device for the disintegration of fungal hyphae.**—*Aust. J. Sci.*, **22**, 8, pp. 348–349, 1 diag., 1960.

At the Sch. Biol. Sci., Univ. Sydney, disintegration of hyphal cells of Basidiomycetes is effected by grinding the frozen material on a high-speed wheel, to the outer face of which a disk of abrasive paper is fixed with a contact adhesive, e.g. Bear brand EC 2530 LV. The type of the abrasive paper varies with the nature of the material under test; in these tests a silicon carbide (Tufbak 150 A) was used.

Mycelial mats from surface cultures or pellets from submerged growth are first

blended (in acetone for cell-wall preparations or buffer for enzymic studies), filtered through fine cloth, washed thoroughly with water or buffer, and the doughy residue moulded into cylinders $6 \times 1\frac{1}{2}$–3 in., which are deep-frozen for at least 24 hr. before immersion in liquid air until quite rigid and then applied to the grinding-wheel with light pressure. The ground material is delivered from the surface at a temp. just above 0° C. and can be then handled by conventional methods.

KLARMAN (W. L.) & CRAIG (J.). **Sterilization of agar media with propylene oxide.**—*Phytopathology*, **50**, 11, p. 868, 1960.

At Univ. Ill., Urbana, unsterilized Petri dishes of potato dextrose agar contaminated with a suspension of bacteria and spores of *Aspergillus*, *Epicoccum*, *Fusarium*, and *Trichoderma* were placed for 24 hr. at room temp. in a 10 l. bell-jar sealed to a flat glass surface and containing an open dish of 10 ml. propylene oxide. No growth developed after removal. When the plates were inoculated 24 hr. after treatment *Pythium debaryanum* and *Sclerotium cepivorum* grew as well as on plates sterilized by heat, while growth of *Diplodia zeae* was very slightly checked.

It is suggested that the method would be of use in school laboratories or outlying field stations.

LUKENS (R. J.). **Conidial production from filter paper cultures of Helminthosporium vagans and Alternaria solani.**—*Phytopathology*, **50**, 11, pp. 867–868, 1960.

At Conn. agric. Exp. Sta., New Haven, cultures were grown in liquid nutrient on a shaker, the mycelia were fragmented in a Waring blender, the fragments centrifuged, resuspended in phosphate buffer (pH 6·4), and distributed in 2 ml. portions on dry filter paper in Petri dishes. Cultures of *H. vagans* produced 1 spore per conidiophore overnight and 3–5 in 3 days; light had little effect. After 24 hr. under fluorescent light *A. solani* produced conidiophores, conidia developing after a further 24 hr. in darkness or daylight. Spores produced in this manner retained their pathogenicity.

CIFERRI (R.) & CORTE (A.). **La nomenclatura italiana delle virosi di piante arboree e degli antiparassitari.** [The Italian nomenclature of viroses of woody plants and anti-parasitic materials.]—*Lingua nostra*, **21**, 3, pp. 92–96, 1960.

An interesting, critical discussion of the difficulties encountered in finding adequate equivalents in Italian for English words describing virus diseases of woody plants and for some other English phytopathological terms.

BAWDEN (F. C.). **Soil-borne viruses.**—*Agriculture, Lond.*, **67**, 8, pp. 387–391, 1960.

A general review of the occurrence, host range and transmission of soil-borne viruses [cf. **40**, 214].

BAWDEN (F. C.). **Physiology of virus diseases.**—*Ann. Rev. Pl. Physiol.*, **10**, pp. 239–253, 1959. [116 ref.]

New evidence since the previous review [**32**, 538], supporting the concept that plant virus diseases are primarily disturbances in the hosts' nucleoprotein metabolism, is discussed under the headings: 'the activity of virus fragments', 'the infection process', 'the influence of host metabolism on virus infections', and 'the influence of infection on host metabolism'.

KÖHLER (E.). **Über die Beeinflussung des Infektionserfolges an Blättern durch Virushemmstoffe.** [On the effect of virus inhibitors on the success of leaf infections.]—*Phytopath. Z.*, **39**, 3, pp. 242–261, 16 graphs, 1960. [Engl. summ.]

Quantitative assessment was made at the Biologische Bundesanstalt für Land- und Forstwirtschaft, Brunswick, of the effect of some plant saps, pigments, and

other compounds on lesions caused by tobacco mosaic virus, potato virus X [**39**, 466], and potato virus A on *Solanum demissum*, *Gomphrena globosum*, and Samsun tobacco. The leaves of *S. demissum* and tobacco reacted similarly (type A; regression curve a straight line on probability paper) to both saps and pigments whereas *G. globosa* reacted differently (type B; regression curve a straight line when plotted linearly) to the plant saps, but according to type A to the pigments. The kind of virus present in the test sap or substance was without effect on the reaction type. Sometimes there was a stimulation of infection. Raspberry leaf sap and malachite green both gave a type C reaction (regression curve a straight line with ordinates arithmetic, abscissae logarithmic). The possible implications of these reaction types are discussed.

Kahn (R. P.), Allen (T. C.), & Zaumeyer (W. J.). **Characteristics of plant-virus inhibitors in Rice, Oryza sativa.**—*Phytopathology*, **50**, 11, pp. 847–851, 2 graphs, 1960.

In further studies at Beltsville and Glenn Dale, Md [cf. **39**, 290], inhibitors of tobacco mosaic virus were found in all 12 of the rice vars. tested. The dilution end-point was 1:3,000 (fresh wt.) for leaf and root extracts and 1:13,000 (dry wt.) for rice polish. The effect is due to 2 or more inhibitors acting on the host rather than on the virus. The extracts had some effect when applied to the lower surface of bean (*Phaseolus vulgaris*) leaves and rinsed off ½–1 hr. before inoculation of the upper surface. They also inhibited infection of various hosts by 11 of the other 14 viruses tested.

Lovisolo (O.). **Ocimum basilicum, nuovo ospite differenziale del virus del mosaico dell' Erba Medica e di altri virus delle piante.** [*O. basilicum*, a new differential host for Lucerne mosaic virus and other plant viruses.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 193–209, 5 pl. (1 col.), 1960. [Engl. summ. 22 ref.]

Of the viruses with which the author inoculated *O. basilicum*, lucerne mosaic has given the best results; different strs. caused completely dissimilar reactions. Potato virus X produced chlorotic or slightly necrotic local lesions of the ring spot type or a line pattern of the oak-leaf type, both being followed by a light systemic mottling with chlorotic ring spots. The yellow str. of cucumber mosaic virus caused a brighter mosaic than that produced by the type str. Reactions to other viruses are described. Of 10 viruses tested, 6 gave typical symptoms and 1 a doubtful result.

Willis (C. B.) & Larson (R. H.). **A new host for Potato virus X in the Leguminosae.**—Abs. in *Amer. Potato J.*, **37**, 10, p. 354, 1960.

In further work [**38**, 538] the crimson clover vars. Chief and Dixie were systemically infected with 2 strs. (ring spot and yellow) of potato virus X [**40**, 121] which were recovered unchanged after 4 months. The 1st symptoms appear after 12–14 days at 18–20° C. as slight interveinal chlorosis followed by veinal necrosis of the entire leaf. After 4–5 weeks systemic infection is evident as a slight interveinal mottle which becomes chlorotic; followed by marked veinal chlorosis. A field str. of X from Green Mountain potato also systemically infected these 2 clover vars.

MacKinnon (J. P.). **Transmission of Potato leaf-roll and Turnip latent viruses by single aphids.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 13, 1960.

At Canada Dept Agric. Res. Sta., Fredericton, N.B., *Myzus persicae* acquired simultaneously and independently in succession potato leaf roll and turnip latent [*Physalis floridana* yellow net] viruses and transmitted either or both to *Physalis floridana*.

Séptima Conferencia Interamericana de Cacao, Palmira, Colombia, 13–19 de julio de 1958.—606 pp., 46 fig., 36 graphs, 7 maps, Bogotá, División Investigaciones Agropecuarias, Colombia [? 1960].

Papers of phytopathological interest have been noticed from a summary [**39**, 401].

Thresh (J. M.). **Quarantine arrangements for intercepting Cocoa material infected with West African viruses.**—*F.A.O. Plant Prot. Bull.*, **8**. 8, pp. 89–92, 1 fig., 1960.

Test plants for grafting should be examined weekly and given fertilizers to correct any nutrient deficiencies, since Mn or Fe deficiency symptoms frequently mask those of viruses. Insects and mites should be eliminated by systemic insecticides and acaricides. Only those viruses causing very mild symptoms are likely to be encountered in quarantine work. Cacao viruses have not been transmitted through seed, but it is wiser to collect seed only from healthy trees in disease-free areas. Intact pods should be transported only when it cannot be avoided and the husks destroyed after removal of the beans. The movement of rooted cuttings should be restricted and the use of budwood encouraged. Top-working of the test plants with a susceptible bud should be used as a final check, the material being considered healthy once the indicator shoot has produced 3 or 4 symptomless flushes.

Pyne (C. T.). **Plant pathology section.**—*Rep. Dep. Agric. S. Leone, 1958*, pp. 27–28. 1960.

This report [cf. **39**, 211] contains a note on the outbreak of a virus disease on cacao [**40**, 32]. In Nov. a 2nd outbreak was found at Giehun, apparently caused by a different str.

In spray trials against *Phytophthora palmivora* on cacao, which has increased to 50% in one area, 1% carbide Bordeaux was superior to 0·4% perepod and 0·4% kopapod, though all gave better results than no treatment (with or without pod removal).

Delassus (M.), Belin (M.), & Bonaventure (P.). **Contribution à l'étude des pourritures des cabosses du Cacaoyer en Basse Côte d'Ivoire durant les années 1958 et 1959.** [A contribution to the study of Cacao pod rots in the Lower Ivory Coast during the years 1958 and 1959.]—*Café, Cacao, Thé*, **4**, 2, pp. 64–79, 7 fig., 1960. [18 ref.]

Losses were much smaller than in earlier years, 10–20% in 1958 and 6–8% in 1959, and were reduced by regular, frequent harvesting. Rotting was most prevalent at the end of June and the beginning of July and appeared to be favoured by heavy rain and relatively low temps. Cu fungicides gave effective control, though with the present small losses it is doubtful whether treatment would be commercially profitable. The fungus most commonly isolated from affected material was *Phytophthora palmivora* [cf. **37**, 466; **40**, 32].

Progress Report 1954–58, Cereal Crops Division, Experimental Farms Service, Ottawa.—39 pp., 10 fig., 1960.

In this final report [cf. **34**, 432] breeding programmes and results for the principal cereal crops, and some other crops, are outlined, especially in relation to breeding for disease resistance, with details of newly licensed vars.

Guyot (L.) & Massenot (M.). **Observations et expérimentations sur la rouille noire des céréales et des Graminées au cours des années 1957 et 1958.** [Observations and experiments on black rust of cereals and Gramineae during the years 1957 and 1958.]—*Ann. Épiphyt.*, **11**, 2, pp. 153–181, 1960.

Further information from the École Nationale d'Agriculture, Grignon, France, is

given on the distribution of physiologic races of *Puccinia graminis* [cf. **37**, 403] in France, Spain [**40**, 96], Germany, Algeria, and Morocco.

In 1958 49% of the identifications in France were of race 21, 24% 133, 14% 186, 7% 14, and 2% each of 17, 19, and 40; and in Morocco 87% of 21, 7% 14, 5% 40, and 1% 17.

Inoculations showed that the wheat vars. GN = 80-3, Guatrache, Oro, and Regent are susceptible to race 40 and GN and Guatrache to 27 also; Newthatch, Thatcher, and Timstein are immune from 21 and 40; Étoile de Choisy is resistant to 17 and to certain strs. of 21, but is susceptible to 27, 40, and 69 and to some strs. of 14 and 21.

P.g. f.sp. *avenae* and *tritici* were isolated for the 1st time from aecidia on barberry [cf. **40**, 36]. Of 74 such isolations made in Burgundy in spring 1957, 37 (50%) were f.sp. *secalis*, 22 (30%) were forms specialized on Gramineae, 8 (11%) were f.sp. *tritici*, and 7 (9%) were f.sp. *avenae*.

Aecidia on *Berberis hispanica* on the Sierra Nevada mountains, Spain, belonged to special forms found on Gramineae, and similar ones on the Atlas Mountains in Morocco were related to Gramineae growing on the mountains locally, some of which bore *P. graminis* f.sp. *tritici*.

Leijerstam (B.). **Physiological races of cereal rusts in Sweden in 1959.**—*Robigo, 1960*, 10, pp. 26–29, 1960. [Span. translation.]

In this further report [cf. **39**, 292] from the Swedish State Plant Prot. Inst., Svalöv, Sweden, it is noted that among races of *Puccinia graminis* not previously encountered in the country was 191. Races of *P. recondita* were similar to those occurring in 1958, except that race 77 was not identified and the percentage of race 20 rose from 3 to 14.

Basile (Rita), Špehar (V.), & Kostić (B.). **Identification of some physiologic races of Puccinia graminis var. tritici, isolated from Berberis vulgaris L. in Yugoslavia during 1959.** –*Robigo, 1960*, 10, pp. 33–39, 1960. [Ital. & Span. translations.]

At Rome race 40 was isolated from material from Zagreb cultured on a series of Gramineae. It is very virulent and attacked 10 of the standard differential wheats. Race 215 was similarly isolated twice from material from Kragujevac [cf. **40**, 35].

Bartoš (P.) & Bareš (I.). **Odrůdová odolnost Pšenic vůči rzi travní (Puccinia graminis Pers.) a rzi pšeničné (Puccinia triticina Erikss.) a Žit vůči rzi travní a rzi žitné (Puccinia dispersa Erikss. et Henn.) za přirozené infekce.** [Varietal resistance of naturally infected Wheat to black rust (*P. graminis*) and brown rust (*P. recondita*) and Rye to black rust and brown rust (*P. recondita*).] –*Ann. Acad. tchécosl. Agric.*, **33**, 8, pp. 1033–1048, 1 fig., 5 graphs, 1960. [Russ., Germ. summ. 28 ref.]

In field tests at Res. Inst. Plant Production, Ruzyně, and in the districts Český Krumlov and Tišnov, Czechoslovakia, with vars. and multiple hybrids (103 summer and 115 winter wheat and 3 summer and 44 winter rye), the results of which are tabulated, the wheat vars. highly resistant to both rusts included Jumillo, Golden Ball, the Bulgarian Erythrospermum 982 I.Z.R. and Lutescens 126 I.Z.R., Hungarian Béké 223 and Béké 293, and S. American Klein Luzero; there were no such outstandingly resistant rye vars., though Krmné 89/57, Trsnaté, and some regional vars. were resistant to a considerable degree.

Thorpe (H. C.). **Wheat in Kenya and sources of resistance to rust.**—*Robigo, 1960*, 10, pp. 29–33, 1 map, 1960. [Span. translation.]

The most serious rust is [*Puccinia graminis*] which occurs in all wheat areas in

Kenya [40. 216] and Tanganyika at all altitudes. From 1958 the races already distinguished (over 20) will be re-numbered to conform to the International System. At present breeding work is based more on field performance under epiphytotic conditions than on seedling reactions. Stripe rust [*P. striiformis*] and leaf rust [*P. recondita*], both also present, have not yet been studied in Kenya for races.

Farkas (G.) & Kiraly (Z.). **Új védekezési eljárás a Búza rozsdabetegségei ellen nikkelsókal.** [A new method of control of Wheat rusts with nickel salts.]—*Növénytermelés*, **9**. 3. pp. 247–250. 1960. [Russ., Engl. summ.]

In field experiments by the Res. Inst. Plant Prot., Budapest, Hungary, *Puccinia graminis* [var.] *tritici* and *P. recondita* [*P. recondita tritici*, cf. **39**. 559] on wheat were effectively controlled by 0·2% $NiCl_2$ [**40**. 182] and $Ni(NO_3)_2$ sol. [**39**. 565].

Overlaet (J.). **Het optreden in België tijdens het jaar 1958 van fysiologische rassen van bruine roest op Tarwe Puccinia recondita Rob. = P. rubigo-vera (D.C.). Wint. var. tritici (Erikss). Carl. = P. triticina Erikss.** [The occurrence in Belgium during the year 1958 of physiologic races of brown rust on Wheat, *P. recondita*.]—*Agricultura, Louvain*, Ser. 2, **8**. 3. pp. 491–508. 1960. [Fr., Engl. summ.]

The 51 uredospore collections from 19 localities yielded 224 isolates of *P. recondita* [cf. **40**. 217] representing races 1, 4, 10, 11, 14, 20, 37, 61, 68, 84, 86, 87, 107, 120, and 143. The most prevalent were 11 [represented in 22 samples], 14 [19], and 107 [20], race 14 accounting for 23, 11 for 22, and 107 for 21%, of all isolates. Their distribution was also fairly wide, race 11 having been found in 15 of the areas investigated and 14 and 107 in 13; 68, representing 8%, of all isolates, was collected in 9 regions; the remainder were sporadic. New for Europe were 10, 86, and 120.

The type of infection on some of the differential vars. was considerably affected by environmental factors, necessitating the use of supplementary spring vars. for certain problematical races, viz. 84, 143, 4, 86, 14, and 107.

Johnston (C. O.). **Physiologic races of leaf rust of Wheat, Puccinia recondita Rob. ex Desm. f.sp. tritici, in the United States in 1959.**—*Plant Dis. Reptr.*, **44**. 10. pp. 778–779. 1960.

The annual evaluation at Kansas State Coll., Manhattan [cf. **39**. 98], showed 23 races of *P. recondita* present on 402 collections from 33 States. Once again race 15 was the most abundant and widespread, followed by 2, 5, and 122 in decreasing order.

Cenóz (H. P.). **Resistant Wheats to the physiologic races of the 'leaf rust' (Puccinia recondita) most common in the Argentine cereal region.**—*Fitotec. Lilloana*, **7**. 10. pp. 22–25. 1960. [Span. translation.]

The recorded reactions of the 5 most widespread races of *P. recondita* [**36**. 92] in the Argentine (2 Arg., 20 Arg., and 20 L.Arg.) on 8 winter and 40 spring wheats at the International Cereal Rusts Nursery, Castelar, are tabulated.

Timian (R. G.). **A virus of durum Wheat in North Dakota transmitted by leafhoppers.**—*Plant Dis. Reptr.* **44**. 10. pp. 771–773. 1960.

The symptoms observed at Fargo in July 1959 resembled those described for wheat striate mosaic virus [cf. **33**. 417; **39**. 564]. The disease was transmitted by *Endria inimica* but not mechanically nor by 3 common cereal aphids.

Navolotskii (A. V.). Новый сорт яровой пшеницы Ленинградская [New variety of summer Wheat 'Leningradskaya'.]—*Sborn. st. po Selek. Pshen. Ovsu. Gorokhu.* [*Sborn. n.-i. Rabot Selek. Semenovod.*] 2. pp. 11–21. 1958.

In the Leningrad, Novgorod, Pskov, and other regions of the N.W. zone the main

regional wheat vars. are Diamant and Tulun 70, the latter derived from Preston (Canada). As the result of repeated individual selection from Tulun 70, Leningradskaya was developed and in 1952 included in the state list. It proved more resistant to powdery mildew [*Erysiphe graminis*: **39**, 406] than Diamant. In 1950 infection in Leningradskaya and Tulun 70 by the 5 point assessment was 0·03 points, in Diamant 0·8; in 1951 Tulun 70 was 0·8, Leningradskaya 1, and Diamant 1·7. There was little difference between Leningradskaya and Tulun 70 in brown rust infection [*Puccinia recondita*: **39**, 403]. Diamant was more susceptible. Loose smut [*Ustilago nuda*: **39**, 466] was assessed by inoculation; infection in 1951, 1953–4 was 27·2, 45·2, and 29·7% respectively. In 1950–54 infection by *P. recondita* was 32 in Leningradskaya, 29·7 in Tulun 70, and 53% in Diamant.

Mathur (R. S.), Atheya (S. C.), Mathur (S. C.) & Jain (J. S.). **Varietal resistance of Wheat to loose smut in Uttar Pradesh.**—*Curr. Sci.*, **29**, 9, pp. 353–354, 1960.

In further tests with 26 vars. against *Ustilago tritici* [*U. nuda*: **33**, 594] in Kanpur, U.P., from 1953–58, only Bansi C.P. was rated as resistant, with less than 1% infection.

Purdy (L. H.). **Results of regional seed-treatment tests for the control of seed-borne and soil-borne common bunt of winter Wheat in the Pacific Northwest, 1959.**—*Plant Dis. Reptr*, **44**, 1, pp. 25–26, 1960.

The results of the annual tests [cf. **38**, 403] of 21 formulations against *Tilletia caries* and *T. foetida* are presented as usual with similar findings in general to those of previous years. No fungicide eliminated bunt completely. As a rule only hexachlorobenzene gave good control of soil-borne bunt (less than 2%).

Zemánek (J.). **Studium účinnosti nových organických fungicidů.** [A study of the effect of new organic fungicides.]—*Ann. Acad. tchécosl. Agric.*, **33**, 8, pp. 1105–1118, 2 fig., 1960. [Russ., Germ. summ.]

At Res. Inst. Plant Production, Ruzyné, 12 trichlormethyl-thio-carbalkoxy-disulphides [listed] and bis-trichlormethyl-trisulphide were tested against *Tilletia caries* and *Fusarium* sp. (in the lab.) and against *T. caries* and *Ustilago avenae* [cf. **39**, 606] (glasshouse and field). The latter chemical proved more effective for seed treatment (200–300 g. 100 kg. seed) and was also less phytotoxic than some of the other compounds. Treatment of damp wheat seed, subsequently stored for 2 months, with a 50% formulation and with orthocide 50 resulted in a notable increase of viability (86 and 93% germination, respectively, 6 days after sowing, compared with 57 in the control).

Guillemat (J.) & Lambert (J.). **Action du traitement aux organomercuriques, de la teneur en eau et de la durée du stockage sur la faculté germinative des semences de Blé.** [The effect of treatment with organo-mercury products, of water-content, and duration of storage upon the germinability of Wheat seed.]—*Phytiatrie-Phytopharm.*, **9**, 2, pp. 63–74, 1960.

There has been a recrudescence in France since 1954 of wheat infection by *Fusarium nivale* [*Calonectria nivalis*], *F. roseum*, and *Septoria glumarum* [*S. nodorum*]. Reduced germination of wheat seed is generally attributable to the lack of or incorrect seed treatment, treatment with a material intended for use against bunt [*Tilletia caries* and *T. foetida*], or treatment of seed containing too much water, though there is no ill effect upon germinability provided the seed does not contain over 16% water.

Details are given of tests at Laboratoire de Pathologie Végétale de l'E.N.A., Grignon, and the Laboratoire des Pesticides, Procida, with Étoile de Choisy and Cappelle seed, untreated and treated with 3 organo-mercury products (wettable powder, dust, and fluid). These showed that the effect of the amount of moisture

present in the seed upon germinability is very important, even after only a very brief storage period, especially if the seed is severely infected [cf. **39**, 225]. Even when over 16% moisture is present, however, treated seed germinates better than untreated.

Burrage (R. H.) & Tinline (R. D.). **Common rootrot and plant development following treatments of Wheat seed with aldrin, gamma BHC, and heptachlor, with and without mercury fungicides.**—*Canad. J. Pl. Sci.*, **40**, 4, pp. 672–679, 1960.

In greenhouse and field tests at the Canada Dept Agric., Saskatoon, there was more root rot when Chinook wheat seed treated with gamma BHC at 1 oz. bush. was grown in soil infested with *Cochliobolus sativus* [**37**, 157] than when aldrin or heptachlor were used. An increase in gamma BHC (but not of heptachlor) from ½ oz.–1 oz./bush. resulted in progressive increases of *C. sativus*, but reduced emergence and seedling weight after higher applications were apparently due to phytotoxicity.

When a Hg fungicide was included with aldrin or heptachlor root rot was reduced and emergence increased. The wheat plants subjected to these treatments and grown in inoculated or uninoculated soils gave similar final grain yields.

Simmonds (P. M.). **Further studies on the infection of Wheat by Helminthosporium sativum.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 16, 1960.

At Saskatoon [cf. **39**, 690] infection tests with seedlings and mature wheat plants again showed that *H. sativum* [*Cochliobolus sativus*] absorbs N from the host. Inoculated seedlings in a weak KNO_3 sol. did not become chlorotic or die as they did in water. The grain of plants inoculated when mature was lower in N and protein than that of healthy plants; that from badly infected field plants tended to be piebald, a sign of N deficiency.

Boosalis (M. G.). **A soil infestation method for studying spores of Helminthosporium sativum.**—*Phytopathology*, **50**, 11, pp. 860–865, 1 fig., 1960.

A method was devised at Neb. Univ., Lincoln, for depositing conidia of a wheat isolate of *H. sativum* [*Cochliobolus sativus*] on soil (about 60,000 5-in. pot), covering with a thin ring-shaped layer of Polyflex (outer diam. 4 in., inner 3 in.) and then with more soil to a depth of 1·5 in., so that even after several months' incubation the soil column could be removed and the spores easily located. Less than 1% of spores germinated [**40**, 163] in natural wheat-field soil at 25° and 3° C.: in sterilized soil the figures were 10% and 42%, germination reaching a max. in 2 and 8 days, respectively. The method is more sensitive to the soil fungistatic factor than Chinn's glass-slide technique [**33**, 627], which yielded a much higher percentage germination in sterilized soil.

Doling (D. A.) & Batts (C. C. V.). **Effect of previous cropping on eyespot and take-all in four varieties of Winter Wheat.**—*Plant Path.*, **9**, 4, pp. 115–118, 1960.

Data are presented from field trials by Nat. Inst. agric. Bot., Cambridge, 1954–57, showing that eyespot (*Cercosporella herpotrichoides*) [cf. **34**, 777; **39**, 19] severely reduced the yield of 4 winter wheat vars., particularly when such crops were grown successively. Under these conditions Cappelle Desprez gave the best yields [**40**, 97].

Saponaro (Anna) & Madaluni (Anna L.). **Ricerche sulla microflora del Grano conservato in magazzino.** [Researches on the microflora of Wheat kept in storage.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, **17** (*1959*), 2, pp. 247–266, 4 fig., 1960. [Engl. summ. 31 ref.]

Examination of 70 samples of foreign wheat seed (mostly from Argentina, U.S.A., Syria, and Russia) stored for 4–6 yr. in different parts of Italy yielded 31 spp. of

fungi [cf. **39**, 691 *et passim*], that most commonly isolated being *Aspergillus flavus*, followed (in descending order) by *Penicillium cyclopium*, *P. frequentans*, *A. candidus*, and *A. versicolor*. *A.* spp. accounted for 42·9% and *P.* spp. for 40% of all the fungi found, showing that the microflora consisted chiefly of fungi deposited upon the grain during storage.

Gerdemann (J. W.) & Weibel (T. O.). **Cephalosporium stripe on small grains in Illinois.**—*Plant Dis. Reptr*, **44**, 11, p. 877, 1960.

During spring 1960 *C. gramineum* [**37**, 33; **38**, 591] was found on winter wheat in 5 localities in Ill. and on oats, barley, and rye in 1, apparently the first record in the U.S.A. of the natural occurrence on the last 3 crops.

Russell (R. C.). **The relation between age of seed and development of loose smut in Barley.**—Abs. in *Proc. Canad. phytopath. Soc.*, **27**, p. 15, 1960.

In further studies at Canada Dept Agric. Res. Sta., Saskatoon [**34**, 590], samples from 15 lots of barley infected by *Ustilago nuda* were sown annually for 10 yr. The decline in percentage infection in the last 5 yr. is attributed to the fact that infected seeds lose their viability more rapidly than healthy.

McFadden (A. D.), Kaufmann (M. L.), Russell (R. C.), & Tyner (L. E.). **Association between seed size and the incidence of loose smut in Barley.**—*Canad. J. Pl. Sci.*, **40**, 4, pp. 611–615, 1960.

Cooperative studies at Exp. Farm, Lacombe, and Plant Path. Lab., Edmonton, Alta, and Res. Sta. Saskatoon, suggested that the use of large barley kernels for seeding would be a practical means for reducing losses from loose smut (*Ustilago nuda*) [cf. **39**, 21] since smaller seeds were found to carry more infection than large. Care in grading seed samples for experimental plots is also evidently important.

Hamilton (D. G.), Clark (R. V.), Hannah (A. E.), & Loiselle (R.). **Reaction of Barley varieties and selections to root rot and seedling blight incited by Helminthosporium sativum P.K. and B.**—*Canad. J. Pl. Sci.*, **40**, 4, pp. 713–720, 1 pl., 4 graphs, 1960.

A method for testing the reaction of barley vars., developed at Canada Dept Agric., Ottawa, Ont. [**39**, 567], consisted of growing surface-sterilized seeds in a mixture of 90% sterilized white silica sand and 10% sand-cornmeal inoculum of the Ottawa isolate of *Helminthosporium sativum* [*Cochliobolus sativus*] [**36**, 183]. The seedlings were kept for 21 days in a glass chamber at 20–22° C. and high R.H. Of 600 vars. and selections tested, 51 were classified as resistant, of which the best were Anoidium, Br. 3962-4, Lenta, and Opal B. The results gave no indication of physiological races.

Morton (D. J.) & Peterson (G. A.). **An inverse relationship between the severities of Helminthosporium leaf-blade and Septoria leaf-sheath symptoms on Barley.**—*Plant Dis. Reptr*, **44**, 1, pp. 23–24, 1960.

At N. Dak. agric. Exp. Sta., Fargo [**38**, 592], Traill barley spore-inoculated with *H. sativum* [*Cochliobolus sativus*] 2 weeks before heading developed severe leaf blotches but at harvest had significantly fewer *Septoria passerinii* lesions in a natural epiphytotic than the non-inoculated plants. The basis for the antagonism has not been established.

Schein (R. D.). **Physiologic and pathogenic specialization of Rhynchosporium secalis.**—*Bull. Pa agric. Exp. Sta.* 664, 29 pp., 2 fig., 6 graphs, 1960. [14 ref.]

This Bull. details work already noted [**38**, 140; **39**, 165]. The results of cultural experiments [cf. **40**, 164] are also presented. On starch media an α-amylase was

produced which diffused through the agar in advance of the mycelium, accounting in part for the slow growth of the fungus.

WATSON (MARION A.) & MULLIGAN (T. E.). **Comparison of two Barley yellow-dwarf viruses in glasshouse and field experiments.**—*Ann. appl. Biol.*, **48**, 3, pp. 559–574, 1 pl., 3 graphs, 1960.

In further work at Rothamsted [**40**, 2] an avirulent (RV) and a virulent (KV) isolate of barley yellow dwarf virus [cf. **38**, 650, 735] from Rothamsted farm and Kent, respectively, were found to resemble each other and the American yellow dwarf viruses [**40**, 219] in their ability to infect wild grasses [cf. **33**, 74], but there were differences in infection tests on inbred lines of the same grass sp. KV infected rice var. GEB 24, causing symptoms similar to those in other cereals, King II rye, and White Horse Tooth maize, in both of which it caused slight stunting and from both of which it was recovered. Rice and maize appear to be previously unrecorded hosts.

When plants were 1st infected with RV and then, when symptoms had fully developed, with KV, the same loss of yield was caused by KV as when plants were infected for the same length of time with KV alone, so there was no protection by RV against KV; aphids (*Rhopalosiphum padi*) fed 1st on sources of RV and then on KV transmitted mainly KV.

The effects of the isolates on the yields of wheat, oats, and barley were related to the time of appearance and intensity of the symptoms; the effect of RV was less than that of KV and more variable.

GEARD (I. D.). **Red leaf of Oats. A virus disease of cereals in Tasmania.**—*Tasm. J. Agric.*, **31**, 3, pp. 320–324, 4 col. fig., 1960.

Suspected symptoms of barley yellow dwarf virus [map 332] were first noticed on oats in Tasmania 8 yr. ago; in 1959 transmission tests confirmed its presence. It infects wheat, oats, and barley throughout Tasmania, also rye, though with little effect. Other areas where the disease is found [**39**, 685] include Victoria.

BURROWS (V. D.). **Nature of the resistance of Oat varieties to races of Oat stem rust.**—*Nature, Lond.*, **188**, 4754, pp. 957–958, 1 fig., 1960.

At the Genetics and Plant Breeding Res. Inst., Ottawa, Ont., a tissue transplant technique [**38**, 360] was modified to investigate the resistance of oats to *Puccinia graminis* f.sp. *avenae*. A strip of epidermis 2–3 cm. long was removed from the undersurface of an oat leaf and the exposed tissue covered with a thin layer of 0·5% water agar which acted as an adhesive and prevented drying-out when 2 such stripped under-surfaces were sandwiched together and the leaf margins cemented with paraffin wax. Three combinations of leaf pairs were prepared, one member of each, the donor leaf, being inoculated with a race of *P. graminis*: when rust mycelium crossed from a susceptible (S) leaf to another S leaf the susceptible-type reaction was obtained on both, while with 2 resistant (R) leaves the resistant-type reaction was recorded; in the 3rd type of pair, in which the reaction of the donor was different from the receiver, S to R gave a resistant reaction on the receiver leaf, while R to S resulted in a susceptible reaction. Similar results were obtained using several different oat vars. and races of the pathogen.

When a donor S-leaf containing radio-active P_{32} was joined with a receiver R leaf some of the P_{32} crossed the mycelial bridge, showing that the failure of the R-leaf to show an S reaction was not due to the inability of the mycelium to transport food materials into the R-leaf.

Resistance to *P. graminis* in oats appears to be due to a specific type of inhibition, the nature of which is unknown; it is not operative beyond the R tissue since mycelium from a donor R leaf grows vigorously in the S leaf. The inhibition may arise from an interaction between the rust mycelium and the host cells.

Sadanaga (K.), Murphy (H. C.), & Grindeland (R.). **Inheritance of stem rust resistance of C.I. 7232, a derived tetraploid Oat.**—*Phytopathology*, **50**, 11, pp. 779–781, 1960.

At Iowa agric. Exp. Sta., Ames, the resistance of C.I. 7232 to races 7, 7A, and 8 of *Puccinia graminis* f.sp. *avenae* [**38**, 689] proved to be conditioned by a single dominant gene different from those (A, D, BC, and E) in hexaploid oats [**40**, 164].

Upadhyaya (Y. M.) & Baker (E. P.). **Studies on the mode of inheritance of Hajira type stem rust resistance and Victoria type crown rust resistance as exhibited in crosses involving the Oat variety Garry.**—*Proc. Linn. Soc. N.S.W.*, **85**, 2 (393), pp. 157–179, 1960. [24 ref.]

Studies at Univ. Sydney clearly showed that Garry comprised a heterogeneous mixture of genotypes. Three factor pairs conditioned resistance to stem rust (*Puccinia graminis* f.sp. *avenae*) [cf. **37**, 318]: Rd_1, an independent gene operative against races 2 and 12, and the linked genes Hj_1 and Hj_2, conditioning seedling resistance to races 2, 10, and 12 and field inoculum. Six factor pairs were concerned with resistance to crown rust [*P. coronata*: **39**, 695] in 3 linkage groups. Group 1 comprised Vc_a, Vc_b, and Vc_1, of which Vc_a and Vc_b were complementary genes for seedling resistance to races 203, 226, 230, 237, 237–4, and 286 [cf. **39**, 407], while Vc_1 conditioned mature plant resistance only. Group 2 comprised Vc_2 and IVc_2, of which Vc_2 conditioned seedling and mature plant resistance but was inhibited by IVc_2. Thirdly, Vc_3 was an independent dominant gene for mature plant resistance only. Resistance to crown rust was independent of that to stem rust.

Simons (M. D.) & Michel (L. J.). **Physiologic races of crown rust of Oats identified in 1959.**—*Plant Dis. Reptr*, **44**, 10, pp. 780–782, 1960.

In 1959 [cf. **38**, 201] 21 new races of *Puccinia coronata* were discovered, 20 of these in Israel [cf. **39**, 695; **40**, 42]. Infection was again rather slight; race 216 constituted about ½ of the 685 isolates received at Iowa agric. Exp. Sta., Ames. Races 290, 293, 294, 295 (the second most common), and 298 are increasing in prevalence, also 264, but at a less rapid rate.

Markitantova (Mme A. V.). Местные Овсы северо-западной зоны РСФСР как исходный материал для селекции в условиях Ленинградской области. [Local Oats of the N.W. zone of the R.S.F.S.R. as initial selection material in the conditions of the Leningrad region.] Сборн. н.-и. Работ Селек. Семеновод. [*Sborn. n.-i. Rabot Selek. Semenovod.*] 2, pp. 79–93, 3 fig., 1958.

Local oats vars. of the N.W. zone tested against the collection at the All-Union Inst. for Crop Production were found to be liable to the same degree of infection by crown rust [*Puccinia coronata*: **39**, 695] as the standard Zolotoĭ Dozhd'. In field assessments in 1949 and 1951, when the disease was serious, the Institute's medium early lines 6174, 6231, and 6205 from the central and southern districts of the Velikolukskaya region were comparatively resistant, as well as the late 6033 and 5386 from the Vologda region. Early maturing vars. were less susceptible; of these, 5692, 5955, and 6255 from the northern districts of the Pskov region and 9689, 5675, 5976/1, and 5979 from the northern part of the Leningrad region were resistant to diseases, and also 6178/1, 6226, and 6207 from the central part of the Velikolukskaya region. In inoculations with loose smut [*Ustilago avenae*: **39**, 466] 6241, 6201, 6184, 6223, and 6205/2 from the Velikolukskaya region, 5942 from the Leningrad region, 6403 from the Vologda region, and 6250 from the Pskov region were relatively resistant.

Nicolson (T. H.). **Survival, colonization and antagonism of induced mutants of Chaetomium globosum Kunze.**—*Plant Dis. Reptr*, **44**, 10, pp. 774–777, 3 fig., 1960.

At Dept Plant Path., Univ. Minn., St. Paul, none of the mutants of *C. globosum*

induced by treating ascospores with 5% uranium nitrate were superior to the parent str. in ability to colonize and survive in oat straw segments buried in non-sterile soil. Only 1 mutant was as antagonistic to *Helminthosporium* [*Cochliobolus*] *victoriae* [**34**, 447] as the parent str. Generally the most actively antagonistic mutants were those which showed the best survival and colonization.

Hammes (J. K.) & Berger (K. C.). **Manganese deficiency in Oats and correlation of plant manganese with various soil tests.**—*Soil Sci.*, **90**, 4, pp. 239–244, 1 graph, 1960.

Of recent years Mn deficiency of oats grown on neutral to slightly alkaline soils has been observed in E. Wis. The objects of these investigations from Dept. Soils, Univ. Wis., Madison, were to evaluate 4 chemical methods of estimating available soil Mn and to define the range of Mn levels that would seriously limit yields. The most reliable and convenient procedure appeared to be H_3PO_4 extraction.

The results indicated that Mn deficiency may be expected to develop when extracts contain less than 20–65 p.p.m. according to the method of extraction. Young plants with < 30 p.p.m. are likely to suffer from N shortage, while < 12 p.p.m. would be regarded as insufficient at maturity.

One leaf spray of $MnSO_4$ at 5 lb./15 gal. water/acre or 1 soil treatment drilled with the seed at 25 lb./acre, mixed with 250 lb. of a carrier, 4–16–6, will rectify the deficiency.

Ruokola (Anna-Liisa). **Torajyvän tuotantomahdollisuuksista Suomessa.** [Possibilities of ergot production in Finland.]—*Maatalous ya Koetoim.*, **14**, pp. 248–259, 1 diag., 2 graphs, 1960. [Engl. summ.]

The author describes inoculation tests on rye with *Claviceps purpurea* during 1952–59 in Finland [**34**, 224], using both the virtually alkaloid-free indigenous str. and foreign isolates with a high alkaloid content. The ergot yields ranged from 83–848 kg./ha., with a max. in 1959, and the total alkaloid content in 1952–3 was at least equal to that obtained in Germany [**38**, 202 *et passim*].

The large-scale spread of the fungus to crops cultivated for domestic purposes (up to 0·44% from a single winnowing) was also investigated and the possibilities of control examined.

Schieber (E.) & Castillo (M.). **Corn stunt disease in Guatemala.**—*Plant Dis. Reptr*, **44**, 10, p. 764, 1 fig., 1960.

The outbreak of maize stunt virus [**37**, 533] in Guatemala during 1960 was the most severe on record, being worst at lower altitudes. Resistant vars. derived from the Mexican Tuxpeno [**38**, 2] are susceptible under field conditions in Guatemala.

Jermoljev (E.), Staněk (M.), & Ujevič (I.). **Studium možnosti zjištění odolnosti odrůd Kukuřice proti původci sněti kukuřičné Ustilago zeae (Beckm.) Unger sérologickými metodami.** [A study of the possibility of determining the resistance of Maize vars. to the causal agent of blister smut *U. maydis* by serological methods.]—*Ann. Acad. tchécosl. Agric.*, **33**, 8, pp. 1067–1078, 1 diag., 1960. [Russ., Germ. summ.]

At the Res. Inst. Plant Production, Ruzyně, Czechoslovakia, the ring precipitation and the complement fixation methods were used to test, respectively, 59 and 41 maize vars. and hybrids [listed]. Seed extracts were examined in respect of their reaction with rabbit antiserum to spore suspensions (10^8/ml.) obtained from 2-day-old cultures. The field tests consisted in contact inoculation of seed or young leaves, or injection close to the growing point with the spore suspension. The results of the ring precipitation agreed with the results of field tests in 85–94% cases, and the complement fixation in 91–100%. The latter is recommended for the selection of resistant vars.

Molot (P.). **Un nouvel Helminthosporium sur Maïs dans le Bassin parisien.** [A new *Helminthosporium* on Maize in the Paris basin.]—*Ann. Épiphyt.*, **11**, 2, pp. 251-256, 1 graph, 1960.

From the Centre de Recherches agronomiques du Sud-Ouest, Pont-de-la-Maye, Gironde, France, a description is given of an infection of maize caused by *Helminthosporium* sp., which appeared for the 1st time in July 1958 in 2 plots 800 m. apart. It was accompanied by small spots on the leaves, leaf-sheaths, leaf-stalks, and ears. It is thought that the causal fungus may be either a new sp. of *H.* or a new race of *H. carbonum* [map 380].

Truszkowska (Mme W.) & Moroniowa (Mme H.). **Badania grzybów wywołujących zgniliznę kolb Kukurydzy.** [Observations on fungi harmful to Maize ears.] *Acta Soc. Bot. Polon.*, **29**, 3, pp. 457–482, 9 fig., 1960. [Fr. summ. 31 ref.]

The fungi most frequently isolated from maize ears in the vicinity of Wrocław in 1956–59 were *Fusarium moniliforme* [*Gibberella fujikuroi*] var. *subglutinans* [map 191] and *F. poae*, the former and *F. anguioides* constituting new records for Poland. Of the 24 other spp. of fungi isolated and described only *G. fujikuroi*, *F. graminearum*, and *Botrytis cinerea* were considered to be damaging.

Schieber (E.) & Sosa (O. N.). **'Hoja blanca' disease of Rice in Guatemala.**—*Plant Dis. Reptr*, **44**, 1, p. 71, 1960.

A note on the 1st occurrence of hoja blanca (on var. Century) in E. Guatemala [**39**, 169].

Fukushi (T.) & Kimura (I.). **On some properties of the Rice dwarf virus.**

Fukushi (T.), Shikata (E.), Kimura (I.), & Nemoto (M.). **Electron microscopic studies on the Rice dwarf virus.**—*Proc. Jap. Acad.*, **35**, 8, pp. 482–484, 1959: **36**, 6, pp. 352–357, 13 fig., 1960.

Rice dwarf virus [cf. **39**, 560] obtained from infective *Nephotettix cincticeps* or diseased plants was injected into virus-free leafhoppers which then transmitted the disease to healthy plants. The presence of the virus was demonstrated in the egg. Infectivity was destroyed by storing virus extract for 72 hr. at 0–4° C. Virus in frozen infective leafhoppers withstood −30 to −35° for 5 months. The thermal inactivation point was 40–45°.

Electron microscopy of purified virus preparations showed spherical particles 40–60 mμ in diam. with a central darker area.

Report of the Eighth Meeting of the Working Party on Rice production and protection of the International Rice Commission. Held at Peradeniya, Ceylon. Dec. 1959.—50 pp., Rome, Food and Agriculture Organization of the United Nations, 1960. [Cyclostyled.]

The sect. of this report [cf. **36**, 56] dealing with physiological disorders of rice in 14 countries has been noticed [**40**, 104].

The most serious diseases in each country are reviewed. A foot rot caused by *Fusarium* sp. is potentially dangerous in N. Australia [cf. **35**, 356]. In Ceylon sheath-rot (*Hypochnus* [*Corticium*] *sasakii*) causes losses in the S.W. and *Helminthosporium sigmoideum* [*Leptosphaeria salvinii*] and *H. s.* var. *irregulare* are severe after floods. In Madagascar *F. moniliforme* [*Gibberella fujikuroi*] and *Piricularia* [*oryzae*] are of prime importance. Brown spot [*Cochliobolus miyabeanus*] occurs in Iran [map 92]. The more serious diseases in Thailand are *P. oryzae* [map 51], *G. fujikuroi*, *L. salvinii*, *H. s.* var. *irregulare*, and *Pseudomonas oryzae*, severe in wet weather. *Piricularia oryzae* is common in the drier areas of Hong Kong.

Little information on methods for assessing field losses due to diseases appears to be available, with the notable exception of methods used in India for *P. oryzae* [cf. **39**, 574]. Forecasting methods for blast in use in India, Japan, and Ceylon are reviewed. In general they involve observation of susceptible vars. at selected sites and the use of correlated meteorological information; available relevant information is to be collated.

Seed disinfection has been used successfully in Ceylon to control foot rot [*G. fujikuroi*]. Hg sprays are phytotoxic to *indica* vars. and not suitable for use against *P. oryzae*. In India *G. fujikuroi* and *C. miyabeanus* are controlled by chemical seed treatments. Hg fungicides are widely used for seed treatments and blast sprays in Japan; trials with antibiotics have been inconclusive. In general Cu fungicides are not very effective against blast but antibiotics show promise.

None of 43 vars. tested have shown resistance to *P. oryzae* in all countries; some of the reports have been inconsistent, either because of the presence of biotypes of the pathogen [**39**, 575] or the effect of environmental conditions; 15 races of *P. oryzae* [**40**, 167] have been reported from Japan.

BARAT (H.). **Les maladies du Riz : état sanitaire des cultures, maladies et affections nouvelles.** [Rice diseases: health of the crops, new diseases and disorders.]—*Bull. Inst. Rech. agron. Madagascar* 3, pp. 76–78, 1 fig., 1959.

In Madagascar *Corticium solani* is common on rice but is usually harmless. Most local vars. are resistant to *Cercospora oryzae* [map 71], but at maturity some vars. bear spots with a grey centre, though the disease appears to do no damage. *Helminthosporium oryzae* [*Cochliobolus miyabeanus*: map 92] causes extensive brown to black areas on the glumes during rainy weather at earing, especially on the W. coast. Much of the seed becomes affected, but in the sunny weather prevailing during germination seedling blight is confined to a few individual plants. The local strains of the fungus are not virulent, but when favoured by cold rain and overcast skies during earing it is capable of causing severe damage.

Ophiobolus oryzinus [cf. **33**, 445; **37**, 512, *et passim*], which infected the Madagascar vars. M 37, M 80, and M 228 on inoculation at Boukoko, French Equatorial Africa, was found on a rice var. from S. Africa being grown in quarantine [in Madagascar]. In germination tests *Helminthosporium* conidia developed though the seed was submitted to hot-water treatment (20 min. at 54° C.) and the seedlings raised in sterilized soil. As the disease has not before been observed in Madagascar it is presumed to have been seed-borne and to have resisted the hot-water treatment.

SATO (K.) & SAKAMOTO (M.). **Studies on Helminthosporium leaf blight of Rice plant. Part 3. Some histological observation on the inner epidermal tissues of leaf sheaths inoculated with the blight fungus.**—*Rep. Inst. agric. Res. Tôhoku Univ.*, **11**, 2, pp. 97–103, 2 pl. (8 fig.), 1960.

This further contribution [cf. **39**, 24] notes that spores of *Cochliobolus miyabeanus* germinated after 3 hr. at 24° C. and infection hyphae invaded the host cells via the middle lamella. Infected cells of type I lesions rapidly turn brown and necrotic but surrounding cells remain healthy. In type II lesions only slight discoloration of infected cells occurs before the tissues are completely invaded and within 3 days conidia may be produced.

A 'Brusone' kérdés újabb elméleti megvilágításban. [The 'Brusone' problem in the light of recent theories.]—*Mag. Tud. Akad. Agrár. Oszt. Közl.*, **14**, 1–3, pp. 219–279, 2 diag., 16 graphs, 1958.

Six papers (pp. 219–254) on rice 'brusone', one of which has been noticed [**39**, 575]; pp. 255–279, discussions.

Prasad (N.), Agnihotri (J. P.), & Agarwal (J. P.). **A new species of Nigrospora Zimm. on Oryza sativa L.**—*Curr. Sci.*, **29**, 9, pp. 352–353, 1 fig., 1960.

N. padwickii Prasad *et al.* causing blackening of rice ears in some districts of Rajasthan, India, is described. The conidia are larger ($37{\cdot}94 \times 34{\cdot}82\,\mu$) than others described in the genus.

Baba (I.) & Tajima (K.). **Nutritional studies in relation to 'akagare' disease of paddy Rice. VI. The effects of excess ferrous iron on the growth, nutrient absorption, and metabolism of paddy Rice.**—*Proc. Crop Sci. Soc. Japan*, **29**, 1, pp. 47–50, 4 graphs, 1960. [Jap.–Engl. summ.]

At nat. Inst. agric. Sci., Japan [cf. **34**, 317; **40**, 105], addition of 100–800 p.p.m. Fe^{++} to the culture solution in which rice plants were grown produced small dark brown spots on the lower leaves, which subsequently turned brown or reddish brown and died. This effect was intensified by high N, lack of P and K, addition of butyric acid, and low pH. Discoloration due to excess Fe was max. at tillering and severe at booting. At heading and flowering discoloration was severe in the grain and yield was sharply decreased by the addition of excess Fe at booting and early ripening, and to a lesser extent at tillering. Resistance of rice vars. to 'akagare' was generally parallel to resistance to excess Fe. Nutrient absorption was inhibited in the order P_2O_5, $MnO > K_2O$, $SiO_2 > NH_4$–N, CaO. Respiratory rate and cytochrome oxidase activity in the root were depressed by excess Fe, while respiratory rate and peroxidase activity in the leaf were stimulated, irrespective of the decrease in cytochrome oxidase activity. Excess Fe also decreased the protein-N content of the leaf and the overall sugar and starch content of the shoot, while it increased the soluble-N content. Results suggest that excess Fe has some connexion with the appearance of 'akagare'.

Mathur (R. S.), Atheya (S. C.), Jain (J. S.), & Mathur (S. C.). **Varietal reaction of Jowar to grain smut in Uttar Pradesh.**—*Curr. Sci.*, **29**, 10, pp. 402–403, 1960.

The results of further resistance trials of sorghum at Kanpur, U.P. [cf. **32**, 676], in which 29 vars. and cultures were tested against *Sphacelotheca sorghi* [**40**, 46]; 3 vars. showed less than 1% infection.

Fedoseeva (Mme Z. M.). Мікроорганізми-антагоністи збудника головні Проса **Sphacelotheca panici miliacei (Pers.) Bub.** [Micro-organisms antagonistic to *S. destruens* the causal agent of Millet smut.]—*J. Microbiol., Kiev*, **22**, 4, pp. 15–23, 6 fig., 1960. [Russ. summ.]

At Kharkov State Univ., 3 categories of micro-organisms antagonistic to *S. destruens* [**39**, 542] were isolated from soil: *Bacillus mesentericus*, *B. megaterium*, and *B. pyocyaneum* depressed growth of cultures, which became furrowed, flat, and dried up; *Trichoderma lignorum* [*T. viride*], *T. koningii*, and *Pseudomonas fluorescens* were lytic; and *B. mycoides* and *Penicillium rugulosum* also depressed growth and even produced partial lysis. The micro-organisms of the 2nd category were the most aggressive, causing complete breakdown of well-developed colonies in 7–10 days. *T. viride* spread considerably by the 2nd day, covering the agar and attacking the colony, into which it had made considerable incursions by the 4th day. The development of the colony was halted, it became withered, and non-viable. Lysis of the younger colonies was followed by that of the old colony. By the 10–12th day a very brittle brown film was all that remained. In field experiments with millet [*Panicum miliaceum*], *T. viride* was propagated on sterilized and unsterilized soil + 30% manure and soil + Flerov's medium. With sterilized substrate 2-fold reduction of infection was obtained with *T. viride* and manure. Unsterilized manure, which evidently contains other mycolytic fungi besides *T. viride*, gave similar results. A 23·5% reduction of field infection was also obtained with *P. fluorescens*.

KNORR (L. C.). **Budwood importation—its dangers and its benefits.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 4–11, 1960. [41 ref.]

In this paper presenting the arguments for and against the importation of citrus budwood into Fla, with particular reference to nucellar material from Calif., is a table of 70 diseases of citrus (not known to occur in Fla) caused by viruses, bacteria, fungi, and mistletoe, with an indication of their relative importance, parts of the tree attacked, and geographical distribution.

GRANT (T. J.), JONES (J. W.), & NORMAN (G. G.). **Present status of heat treatment of Citrus viruses.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 45–48, 2 fig., 1960.

In further studies [cf. **37**, 659] tristeza virus in roots (as well as tops) of young potted Temple orange and Persian lime plants was inactivated by heat treatment for up to 360+ days, the roots at the same time being kept 10–15° F. cooler than the air temp. (95±3°) in which the tops grew. By this method budwood of 15 hybrid vars. and 1 navel orange has been obtained free from tristeza.

MOREIRA (S.). **Um novo problema para nossa citricultura.** [A new problem for our Citrus growers.]—*Rev. Agric. Piracicaba*, **35**, 2, pp. 77–82, 1960. [Engl. summ.]

Stem pitting, one of the known symptoms of tristeza virus [**38**, 691], is spreading in the plantings of Pera orange, the main late var. in the States of São Paulo and Rio de Janeiro, Brazil. There is no rootstock-scion relationship in the affected trees. It is proposed by the Inst. Agronômico, Campinas, to exclude Pera from new plantings and to use the late vars. Natal, Valencia late, or Lue Gim Gong, which seem more tolerant of strong tristeza strs.

SCHNEIDER (H.). **Sectioning and staining pathological phloem.** –*Stain Tech.*, **35**, 3, pp. 123–127, 2 fig., 1960.

The author's procedure (*Hilgardia*, **21**, 12, pp. 352–353, 1952) for simultaneously staining the phloem of numerous samples of citrus bark from healthy and tristeza virus-diseased trees [cf. **32**, 677] has been in use at the Dept Plant Path., Univ. Calif., Riverside, since 1947, and was recently applied successfully to an investigation of a pear decline disease which involved the treatment of 700 bud-union samples, 20×4 mm. Improved techniques suitable for studies of this nature are now described.

Baskets for the sections are prepared by pressing a disk of 50-mesh nickel wire screen (or 100-mesh for fine feeder roots) into the melted end of a short piece of glass tubing with a carbon rod. The material is stained and rinsed in a Buchner funnel which is agitated by a motor. Of the 3 methods tested, the most useful for sections is to fix for 24–48 hr. in Randolph's 'craf' (modified Navashin), mordant for 4–20 hr. in 4% Fe $(NH_4)_2SO_4$, wash thoroughly, stain progressively with 0·006% aqueous haematoxylin, then after washing for 15–72 hr. in 0·1% lacmoid, wash in tap water and for 10 min. in 1% $NaHCO_3$, then through tertiary butyl alcohol and clove oil to Canada balsam. Sieve-plate callose and lignin turn blue, cellulose walls of living cells purplish-black, and walls of non-living cells brown to purplish-black. The vacuoles of some ray cells stain red. For coloured photomicrographs sections stained in Congo red and lacmoid are excellent for sieve-plate callose.

VARMA (P. M.), RAO (D. G.), & VASUDEVA (R. S.). **Additional vectors of tristeza disease of Citrus in India.**—*Curr. Sci.*, **29**, 9, p. 359, 1960. [15 ref.]

In transmission studies at the Div. Mycol. Plant Path., New Delhi, 12 Key [W.I.] lime and 8 Kagzi lime seedlings were infected with tristeza virus [**39**, 309] by *Myzus persicae*, and 12 of 20 Key lime plants by *Aphis gossypii* [cf. **37**, 535]. Thus the str. of tristeza present in India may be transmitted by these aphids in addition to *Toxoptera citricidus*. This is the 1st record of the transmission of tristeza by *M. persicae*.

Reichert (I.) & Bental (A.). **Citrus varieties in Israel infected with tristeza.**—*—Ktavim (Rec. agric. Res. Sta. Rehovot, Israel)*, **10**, 2, pp. 53–58, 4 fig., 1960.

An extensive indexing programme from 1956–9 disclosed that trees of 18 citrus vars., all imported into Israel many years previously, were infected by tristeza [**39**, 704] and some also by citrus xyloporosis virus. The apparent absence of spread of tristeza may be due to the lack of an efficient insect vector.

Citrus research. *–J. Agric. S. Aust.*, **64**, 1, pp. 3–8, 9 fig., 1960.

In the 18 months previous to the time of writing many citrus trees declined rapidly without root-rotting symptoms, the decline of some being hastened by moisture stress. The symptoms were puzzling until a Seville sucker was found under one of the affected trees, indicating the likelihood of tristeza infection [**39**, 308], which was subsequently confirmed by indexing [cf. **37**, 134]. Outbreaks in recent years have coincided with heavy infestations of the black citrus aphid [*Aphis tavaresi*].

This investigation also disclosed that many of the decline trees were on sweet orange stock: the possibility that xyloporosis virus might also be involved is being tested by indexing. A preliminary survey of grapefruit stem-pitting in the Waikerie district indicated that no budlines are suitable for indexing as parent trees in the area.

King (J. R.), Jutras (P. J.), & Thompson (W. L.). **Current studies on the efficiency of equipment for the application of pesticides to Citrus trees in Florida.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 16–21, 1 fig., 6 diag., 1960.

At Fla Citrus Exp. Sta., Lake Alfred, the distribution of air delivered by commercial spraying machines was studied, and an attachment (C.E.S.) designed to direct more spray into the tops of trees. By this means the 35 m.p.h. curve was extended 10 ft. higher and 4 ft. more in diam. The nozzle arrangement giving max. coverage was determined by comparing the distribution of Cu spray deposits on individual leaf surfaces by Blodgett and Mader's technique [**13**, 587]. The performances of various attachments were compared by mounting each in turn on a John Bean Speed Sprayer, Model 42 E 1, with the fan turning at 2,200 m.p.h., delivering 30 gal. dilute spray or 3·75 gal. conc. spray tree. The best coverage was obtained with the C.E.S. attachment.

In a further trial a planting of large grapefruit trees with overlapping branches was sprayed with 5 different machines, the air-blast sprayers applying 35 gal. dilute Cu spray tree and a helicopter 2 gal. 12 % conc. spray. Only the machine with the C.E.S. attachment gave good coverage of all parts of the tree, except the undersurfaces of top outside leaves.

In a 3rd test with grapefruit trees interlocking in the row but hedged between, better coverage was obtained with single head than with double head or hand guns.

Crossa-Raynaud (P.). **Le 'mal secco'.** [Mal secco.] Reprinted from *Vign. Jard. Verg. Tunis., Mar., 1960*, 7 pp., 1960.

Symptoms of citrus 'mal secco' disease (*Deuterophoma tracheiphila*) and its distribution in the Mediterranean area [map 155] are given. There appears to be at least 1 important centre of infection in Tunisia, at Soukra, where lemons and sweet limes are affected. Recommendations for control by spraying and the selection of resistant vars. are given.

Tsao (P. H.). **A serial dilution end-point method for estimating disease potentials of Citrus Phytophthoras in soil.** –*Phytopathology*, **50**, 10, pp. 717–724, 3 diag., 1960.

A detailed account of the method [**38**, 4] and of further tests which confirm the accuracy and reproducibility of the results obtained.

KLOTZ (L. J.), DEWOLFE (T. A.), ROISTACHER (C. N.), NAUER (E. M.), & CARPENTER (J. B.). **Heat treatments to destroy fungi in infected Citrus seeds.**—*Calif. Citrogr.*, **46**, 2, pp. 63–64, 1960. [10 ref.]

At Univ. Calif. Citrus Exp. Sta. citrus seeds naturally contaminated by *Phytophthora citrophthora* and *P. parasitica* were disinfected by immersion in water at 120° F. for 4–10 min. [**37**, 165], but 125° for 10 min. is recommended to ensure protection as this treatment does not impair germinability. Seed for storage should then be surface-dried, dusted with arasan, and stored in polyethylene sacks at 40–45°.

KIELY (T. B.). **Speckled blotch of Citrus.**—*Agric. Gaz. N.S.W.*, **71**, 9, pp. 474–476, 3 fig., 1960.

It is tentatively suggested that speckled blotch of Washington Navel and Joppa oranges, grapefruit, and Emperor mandarins at Windsor and Hawkesbury, and of Valencia oranges at East Kurrajong, known since 1930–32, when it was serious, and recently again of economic importance, is caused by an early form of black spot (*Guignardia citricarpa*) [**37**, 585] developing after early March from latent infection initiated in the spring and early summer under conditions not yet fully understood. Blotching consists of few to many superficial, discrete, roughly circular, depressed or slightly raised spots, 1–2 mm. diam., at first brick red, later dark brown. Good control is given by 2 Bordeaux sprays (4–4–80 + ½ gal. white oil emulsion) at full petal fall.

COHEN (M.). **Greasy spot in Florida—its control and apparent cause.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 56–60, 1960.

At the Citrus Exp. Sta., Lake Alfred, the most effective control of greasy spot (*Cercospora* sp.) [**40**, 150] was afforded by tribasic $CuSO_4$ (1 lb. 100 gal.) + 1·3% oil, applied after the foliage was fully expanded in May and again in July.

PATRICK (R.) & NEWHALL (W. F.). **Fungicidal activity of some new amino alcohols synthesized from Citrus (+)-limonene.**—*J. agric. Fd Chem.*, **8**, 5, pp. 397–399, 1960.

At Fla Agric. Exp. Sta., Gainesville, 4 derivatives of 2-amino-1-*p*-menthanol synthesized from (+)-limonene (*J. org. Chem.*, **24**, pp. 1673–1676, 1959) were toxic to *Penicillium digitatum*, *P. italicum*, *Diplodia natalensis*, and *Phomopsis* [*Diaporthe*] *citri* [**40**, 47, 149] on inoculated gauze pads, and also as aqueous emulsions at 0·0001–1% + a few drops of tween 80 applied to the stem-ends of Valencia oranges stored at 21° C. and 85–90% R.H. for 4 weeks.

Most effective in inhibiting fungal growth in *in vitro* tests at a max. dilution of 1:1,000 after incubation for < 53 days were 2-amino-1-*p*-menthanol, 2-dimethylamino-1-*p*-menthanol, and 2-dimethylamino-$\triangle^{8(10)}$-*p*-menthen-1-ol. The remaining compound and tetrahydrocarvone, another derivative of (+)-limonene, do not merit further trials. The comparative dilution for the salicylanilide control after 43 days was 1:10,000. Very effective control of fruit decay (80%) after 3 weeks' storage and 57% after a month was given by 1% 2-dimethylamino-*p*-menthanol, which at 0·001% also reduced infection by 80% after 3 weeks.

ROISTACHER (C. N.), KLOTZ (L. J.), & GARBER (M. J.). **Tests with volatile fungicides in packages of Citrus fruits during shipment to eastern markets.**—*Phytopathology*, **50**, 11, pp. 855–860, 2 graphs, 1960.

Statistical analysis at Univ. Calif. Citrus Exp. Sta., Riverside, showed that citrus fruits treated with biphenyl and handled commercially had less decay, soilage (with spores from adjacent infected fruit), and chemical injury than those treated

with ammonia [**40**, 168]. With excessive condensation, ammonia sometimes injured the rind of lemons and navel oranges but not Valencias.

For shipments of fruit inoculated with *Penicillium digitatum* and *P. italicum* biphenyl was better than ammonia for lemons, both treatments were equally good for navel oranges, and ammonia was better for Valencias.

HELLINGER (ESTHER). **A new type of Citrus fruit rot caused by P. italicum Wehmer.** —*Nature, Lond.*, **188**, 4748, pp. 424–425, 1960.

In Marks & Spencer's Analytical Lab., 47, Baker St, London, a dark red to bronze red rot of Israeli citrus fruits invariably yielded *Penicillium italicum*, though *Ascocybe grovesii* [**34**, 332] was isolated once, and on inoculation induced a reddish brown to dark brown rot. *P. italicum*, however, was found to react strikingly to diphenyl, commonly used as a fungistat for citrus. Its growth on agar was arrested, with the development of small, raised colonies which changed from whitish to yellow-bronze to reddish bronze, often with a peripheral dark red zone; most of the hyphae in the pigmented zone had reddish contents and conidial formation was inhibited. When oranges inoculated with *P. italicum* were placed in closed jars with diphenyl an atypical reddish rot developed, similar to that found on consignments of oranges from Israel.

DAVIS (P. L.) & HARDING (P. L.). **Keeping quality of Marsh Grapefruit after nitrogen and potash fertilization.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 83–87, 1960.

Marsh grapefruit stored at agric. Market Serv., Orlando, at 40° F. for 6 weeks developed pitting, and that stored at 50–70° developed more decay than fruit stored at 32 or 40° regardless of the fertilization received during growth (0·5–5 lb. K_2O/tree/annum).

WALLIS (J. A. N.) & FIRMAN (I. D.). **Preliminary report on the control of Coffee leaf rust by low volume spraying.**—*Kenya Coffee*, **25**, 298, pp. 417–419, 421, 2 graphs, 1960.

In a field trial at the Coffee Res. Sta., Ruiru, Kenya, against coffee leaf rust [*Hemileia vastatrix*: cf. **40**, 223] the trees (8 × 8 ft.) were sprayed on 17 and 18 Mar. 1960, when about $\frac{1}{5}$ of the leaves bore one or more rust lesions, with a Kiekens Whirlwind mistblower (K.W.H. Type 75). Perenox (50% Cu) was applied at $7\frac{1}{2}$, 60, and 120 gal. acre, each vol. at 6, 12, and 18 lb. Cu acre. Determinations made immediately after spraying clearly showed that the greater the spray vol. the smaller the initial Cu deposit.

All the treatments gave very marked control. By the 11th week after spraying 89% of the leaves on the unsprayed were rusted, as against 12% for the plots given $7\frac{1}{2}$ gal./acre at 6 lb. acre and 9% for that given 120 gal./acre at 18 lb./acre; the corresponding figures for av. no. of rust lesions/100 leaves were 1133, 41, and 11. On the treated trees leaf fall was greatly reduced and virtually none of it was due to rust. It is concluded that it should be possible to control the disease with a spray vol. of under 10 gal. acre, though it is not yet possible to recommend entirely suitable spraying equipment.

BARAT (H.), DADANT (R.), & BAUDIN (P.). **Le dépérissement du Caféier d'Arabie sur les plateaux.** [Wilt of Arabic Coffee on the plateaux.] —*Bull. Inst. Rech. agron. Madagascar* 3, pp. 81–83, 5 fig., 1959.

This information concerning a wilt associated with *Fusarium* ? *lateritium* has been noticed [**39**, 708].

MOSTAFA (M. A.). **Review of fungal diseases of Cotton in Egypt.**—*Egypt. Rev. Sci.* 3, 55 pp., 1959. [260 ref.]

The greater part of this review is devoted to *Fusarium* wilt (Sect. 1, pp. 7–23)

[**37**, 661; **39**, 312] and damping-off (Sect. 2, pp. 24–35) [**37**, 721], in which the etiology, symptoms, factors affecting, and control are discussed. Sect. 3 (pp. 36–37) is a brief note on root rot (*Macrophomina phaseoli*), the incidence of which is decreased by accompanying *F. oxysporum* [f. *vasinfectum*] infection. Boll-rot (Sect. 4, pp. 37–38) is caused by *Rhizopus nigricans* [*R. stolonifer*], which can only enter bolls already damaged by 'worms' (*Gelechia gossypiella* and *Earias insulana*). Isolations from roots of plants with red leaf disease (Sect. 5, pp. 38–40) yielded primarily *M. phaseoli*, and also *Rhizoctonia* [*Corticium*] *solani* [**34**, 691] and *Fusarium* spp. For the 1st time (in 1949) a *Phytophthora* sp. was isolated from 2 cotton vars. suffering from black stem collar disease (Sect. 6, p. 40). In Sect. 7 (pp. 40–41) are listed leaf spots which attack cotton late in the season, *Alternaria*, *Helminthosporium*, and *Cercospora*.

Bazán de Segura (C[onsuelo]). **Notes on Cotton diseases in Peru.**—*F.A.O. Plant Prot. Bull.*, **8**, 11, pp. 132–134, 1960.

The diseases of cotton in Peru include *Verticillium alboatrum* [**39**, 709], one of the most important, black root rot (*Thielaviopsis basicola*—nematodes), bacterial blight (*Xanthomonas malvacearum*) [**35**, 890], powdery mildew (*Erysiphe malachre*) [**11**, 511], damping-off (*Rhizoctonia* [*Corticium*] *solani*), and leaf spots, including *Alternaria tenuis*. During the 1959–60 season a previously unrecorded disease attacked and killed ratoon cotton plants growing on land previously under trees. Fructifications of *Fomes* sp. appeared round the collar of affected plants, which were removed and burned.

Hunter (R. E.), Staffeldt (E. E.), & Maier (C. R.). **Effects of soil temperature on the pathogenicity of Rhizoctonia solani isolates.**—*Plant Dis. Reptr.*, **44**, 10, pp. 793–795, 1 graph, 1960.

At New Mex. agric. Exp. Sta., University Park, the pathogenicity of 3 isolates of *R.* [*Corticium*] *solani* [**40**, 48] to Acala cotton varied according to soil temp. (20–32° C).

Gubanov (G. Ya.) & Bredikhina (Mme A. I.). О физиологии больного вилтом Хлопчатника. [On the physiology of Cotton infected by wilt.]—*Узбек. биол. Ж.* [*Uzbek. biol. Zh.*], *1960*, 5, pp. 35–38, 1960. [Uzbek summ.]

Results obtained at the Inst. Cotton Select. and Seed Breeding, Uzbek S.S.R., showed that the quantity of pectin substances and starch in the stem xylem is reduced in cotton plants infected by *Verticillium dahliae* [**40**, 107], while the phenol compounds are considerably increased. Inoculation to various parts of the stem disrupts metabolism only as regards the flow of water from root to leaves. The effect of the fungus on flow in the opposite direction is slow to appear during the growing period.

Tarr (S. A. J.). **The effects of fungicide-insecticide seed treatments on emergence growth and yield of irrigated Cotton in the Sudan Gezira.**—*Ann. appl. Biol.*, **48**, 3, pp. 591–600, 1960.

The author (Univ. Exeter) describes fungicide-insecticide seed treatment in the Sudan Gezira [**39**, 311], mainly against *Xanthomonas malvacearum* particularly with MEMA [**38**, 207; **40**, 224] and dieldrin, which improved emergence, growth, and yield of irrigated Egyptian-type cotton. Some compounds, including those containing MEMA and gamma-BHC, were slightly phytotoxic, but at the levels applied (0·043% Hg/seed and 0·12–0·24% insecticide/seed by wt.) this seems unimportant and would probably be outweighed by the benefits from the treatment. Phytotoxicity tended to become greater with increasing no. of seeds/sowing hole.

SCHNATHORST (W. C.) & HALISKY (P. M.). **Potentially serious Cotton disease, angular leaf spot, established in California.**—*Calif. Agric.*, **14**, 11, pp. 5–6, 4 fig., 1 map, 1960.

SCHNATHORST (W. C.), HALISKY (P. M.), & MARTIN (R. D.). **History, distribution, races, and disease cycle of Xanthomonas malvacearum in California.**—*Plant Dis. Reptr*, **44**, 8, pp. 603–608, 1960.

During 1958–9 widely separated outbreaks of this disease in the San Joaquin Valley were caused by race 1 of *Xanthomonas malvacearum* [map 57], which has been present in several counties of the State [**38**, 208] since 1951.

ANSELME (C.), BOURGEOIS (M.), & CHAMPION (R.). **L'analyse sanitaire des semences. Résultats obtenus sur les semences de Lin issues des campagnes 1957, 1958 et 1959.** [The sanitary inspection of seed. Results obtained with Flax seed produced in 1957, 1958, and 1959.]—*C. R. Acad. Agric. Fr.*, **46**, 13, pp. 778–782, 1960.

Of seed from all 3 flax-growing departments of France, viz. Seine-Maritime, Calvados and the Pas-de-Calais, and Seine-et-Oise and Oise, the percentage infected by *Botrytis cinerea* [cf. **40**, 171] in (1) each year was significantly related to that infected in the other 2; in (2) the percentage remained unchanged. In wet periods increase in the percentage was 12 times as great in Oise area as in Seine-Maritime.

Ascochyta linicola [**38**, 747] infected seed to an irregular extent in each zone. *Polyspora lini* [loc. cit.] was favoured by dry weather. *Alternaria linicola* [cf. **38**, 146] is mainly confined to linseed flax, but in Oise, with both types, fibre flax seed had a higher percentage of infection than where fibre flax alone is grown. *Fusarium* sp. was particularly prevalent in a wet year, such as 1958. *Cladosporium herbarum* [cf. **35**, 609] was very prevalent on linseed in 1959, drought having apparently hindered the growth of other fungi.

ANSELME (C.). **Recherches sur le pasmo des Lins à huile.** [Researches on pasmo disease of oil Flax.]—*Ann. Épiphyt.*, **11**, 2, pp. 201–215, 4 fig., 1 graph, 1960.

This account of studies at the Sta. centrale de Pathologie végétale, Versailles, on *Septoria linicola* [*Mycosphaerella linorum*] details information and recommendations which have been noticed [**33**, 538; **38**, 747].

ANSELME (C.). **La brûlure du Lin à l'origine d'une étude sur les propriétés antifongiques des extraits de Lupinus luteus L.** [Flax scorch as the basis for a study on the antifungal properties of extracts from *L. luteus*.] -*C. R. Acad. Agric. Fr.*, **45**, 17, pp. 854–858, 1959.

Promising results were obtained in this preliminary study on the inhibitory effect of extracts of leguminous plants, in particular lupins, on *Pythium megalacanthum* [cf. **40**, 108], the fungus mainly responsible for flax scorch. The antifungal effect of the macerated lupin plants introduced into the soil would appear to be due to an acid or group of acids capable of acting at a relatively low conc. Analyses of soils showed that the level of phosphoric acid was 3 times higher in soil where flax scorch was present than in healthy soil. A solution of 1/1,000 of a chloroform extract from lupins reduced infection of young flax plants by *Botrytis cinerea* by 64%.

KEMPANNA (C.), YARAGUNTAIAH (R. C.), & GOVINDU (H. C.). **Occurrence of Colletotrichum curvatum Briant and Martyn on Crotalaria juncea Linn. in Mysore.**—*Curr. Sci.*, **29**, 9, pp. 357–358, 1960.

At the agric. Res. Sta., Hebbal, Bangalore, wilting *C. juncea* seedlings and mature plants were found to be infected by *C. curvatum* [**9**, 187].

McFadden (L. A.). **Control of leaf and flower diseases of florists' Chrysanthemums.** —*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 385–388, 1 fig., 1960.

The best control of both *Ascochyta chrysanthemi* [**39**, 79] and *Botrytis cinerea* [loc. cit.] was given by $\frac{1}{2}$ lb. maneb+$\frac{3}{4}$ lb. captan/100 gal. applied weekly during growth and twice weekly on open blooms. Bacterial leaf spot (*Pseudomonas* sp.) [loc. cit.] was controlled by weekly applications of tribasic $CuSO_4$ (4 lb./100 gal.) or agrimycin 500 (3 lb./100 gal.).

Woltz (S. S.). **Symptoms of nutritional disorders of Chrysanthemums and Gladiolus.** —*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 383–385, 1960.

Descriptions are given of symptoms of deficiency of Ca, B [**35**, 768], Cu, Fe, and Mn [**38**, 118]. Larger amounts of sucrose than in controls and an unidentified sugar were present in B-deficient [**35**, 527] chrysanthemum leaves, and larger amounts of amino-acids in Fe and Mn-deficient leaves than in normal ones.

McFadden (L. A.). **Bacterial blight of Poinsettia.**

Creager (D. B.). **Inoculation studies with Corynebacterium poinsettiae.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 392–394, 2 fig.; pp. 417–421, 3 fig., 1960.

This information has been noticed [**40**, 110].

Corbett (M. K.). **Chlorotic ringspot of Vanda Orchid caused by Cymbidium mosaic virus.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 398–403, 2 fig., 1 diag., 1960. [20 ref.]

A virus isolated from plants of *Vanda rothschildiana* with a chlorotic ringspot in Fla was identified as [orchid] *Cymbidium* mosaic virus [cf. **39**, 713]. It induced local lesions in *Cassia occidentalis* and *Datura stramonium*, withstood a dilution of 10^{-4}, and 68° C. for 10 min.

Mokrá (Věra). **Příspěvek k identifikaci virové nekrózy zjištěné na Primula obconica Hance v Československu.** [A contribution to the identification of virus necrosis discovered on *P. obconica* in Czechoslovakia.]—*Ann. Acad. tchécosl. Agric.*, **33**, 8, pp. 1175–1190, 5 fig., 1960. [Russ., Germ., Engl. summ. 39 ref.]

At Res. Inst. Ornamental Plants, Průhonice, this disease, known from Prague, Brno, and Bratislava, was sap-transmitted from necrotic leaves to *P. obconica*, with resultant aucuba type of mosaic and progressive systemic infection, and to Samsun and White Burley tobacco, *Nicotiana glutinosa*, *Chenopodium quinoa*, *C. nuttaliae*, bean (*Phaseolus vulgaris*) vars. Früher Wachs and Bronovická zelenoluská, and cowpea, with the production of necrotic leaf spots. Thermal tolerance was 85° C. for 10 min. and 90° for 1 min., and the dilution end point 10^{-4} for virus in *P. obconica* sap and 10^{-5} for bean. The virus is considered to be a str. of tobacco necrosis [cf. **37**, 420 *et passim*].

Munnecke (D. E.), Chandler (P. A.), & Bivins (J. L.). **Investigations show Azalea root rot can be controlled by soil treatment.** —*Calif. Agric.*, **14**, 9, pp. 9–10, 2 graphs, 1960.

The primary pathogen responsible for root rot of azaleas [*Rhododendron*] in Calif. is *Pythium* sp., though other fungi including *Phytophthora*, *Fusarium*, and *Rhizoctonia* are also isolated from affected roots. Earliest symptoms are a loss of vigour and wilting, followed by leaf fall until only a few terminal ones are left. In a trial of chemical soil treatments at Univ. Calif., Los Angeles, significantly larger plants were obtained in soil treated with methyl bromide (1 lb./100 sq. ft.).

Holmes (F. O.). **Rose mosaic cured by heat treatments.**—*Plant Dis. Reptr*, **44**, 1, pp. 46–47, 2 fig., 1960.

Further details [**39**, 586] are given of the elimination of the yellow-mottling str. of rose mosaic virus.

Ostazeski (S. A.) & Wells (H. D.). **A Phomopsis stem blight of Yellow Lupine (Lupinus luteus L.).**—*Plant Dis. Reptr*, **44**, 1, pp. 66–67, 1 fig., 1960.

Yellow field lupins in Ga in 1954–5 and 1955–6 and in Fla in 1957–8 were infected by *P. leptostromiformis* [**37**, 484], a new record for the U.S.A. In greenhouse tests yellow and white lupins were susceptible to inoculation but blue was not. The fungus was shown to be seed-borne and appears to persist in seed for at least 2 yr.

Sackston (W. E.). **Studies on Sunflower rust. II. Longevity of uredospores of Puccinia helianthi.**—*Canad. J. Bot.*, **38**, 6, pp. 883–889, 1960.

At Macdonald Coll., Que., uredospores of *P. helianthi* [**37**, 104; **39**, 714] survived 846 days at 5° C. and 1,652 days at −10° to −22°. Longevity was decreased by storage under mineral oil, though germination and infectivity of viable spores was unaffected by dispersal in oil. Compared with other rusts, *P. helianthi* possesses remarkable tolerance of low temps., a factor which may have helped in the spread from N. America to other parts of the world [map 195], possibly by very high altitude air currents.

Mulligan (T. E.). **The transmission by mites, host-range and properties of Rye-grass mosaic virus.**—*Ann. appl. Biol.*, **48**, 3, pp. 575–579, 1 pl. (2 fig.), 1960.

At Rothamsted exp. Sta. *Abacarus hystrix* acquired rye grass mosaic virus [cf. **36**, 812; **38**, 736] in 2 hr. from infected rye grass [*Lolium*]; the number that became infective increased with longer feeding times < 12 hr. All instars of *A. hystrix* transmitted the virus.

Sap transmission was successful to other spp. of Gramineae, including oats, rice, cocksfoot (*Dactylis glomerata*), and meadow fescue (*Festuca pratensis*), but these hosts seemed to contain less virus than rye grass and their saps did not precipitate specifically with antiserum prepared against the virus in rye grass. Infective sap of S22 Italian rye grass (*L. multiflorum*) contained flexuous, rod-shaped particles; the dilution end-point of the virus was about 1 in 1,000; the virus was inactivated in 10 min. at 60° C. and lost most of its infectivity after 24 hr. at room temp. The host range differs from that of the mosaic of Italian rye grass and cocksfoot described from Washington [**37**, 98].

Madison (J. H.), Petersen (L. J.), & Hodges (T. K.). **Pink snowmold on Bentgrass as affected by irrigation and fertilizer.**—*Agron. J.*, **52**, 10, pp. 591–592, 1960.

In exp. plots at Univ. Calif., Davis, the incidence of snow mould [cf. **16**, 258] (*Fusarium nivale* [*Calonectria nivalis*] and low-temp. str. of *Rhizoctonia* sp.) on highland bent (*Agrostis tenuis*) treated with urea-formaldehyde was considerably higher than with urea at the same N rate (2 lb./sq. ft./month), whereas N level was irrelevant. Morning and daily irrigation favoured the disease. On seaside bent (*A. palustris*) incidence depended on N level and was not significantly affected by N source or irrigation schedule.

Yakimovich (E. D.). Болезни Гречихи. [Diseases of Buckwheat.]—Труд. н.-и. Инст. Земледелия Районов нечерноземн. Полосы. [*Trud. n.-i. Inst. Zemled. Raĭonov nechernozemn. Polosy*], *1959*, 17, pp. 256–263, 1959. [Abs. in *Referat. Zh. Biol.*, *1960*, 15, p. 173, 1960.]

In years with heavy rainfall in the 2nd half of the growing period (1950 and 1955)

buckwheat in the Moscow region was severely infected by grey mould [*Botrytis cinerea*: cf. **33**, 669], with a 15% reduction in yield. Sowing in wide rows and seed treatment with thiram (300 g./centner seed) or granosan (200 g.) gave the most effective control.

GRAHAM (J. H.), RHYKERD (C. L.), & NEWTON (R. C.). **Internal breakdown in crown of Red Clover.**—*Plant Dis. Reptr*, **44**, 1, pp. 59–61, 1 fig., 1960.

At Univ. Park, Pa, field and greenhouse plants showed symptoms of internal breakdown [**39**, 322] at 3 months, when small, dark, watery necrotic areas appeared in the pith of the crown. Incidence increased as the plants matured, the affected areas enlarging, drying, and turning corky. No organism was associated with the disorder, nor did plants respond to additions of minor elements. The disease is widespread from Maine to Va and further investigations are in progress.

SINHA (R. C.). **Red Clover mottle virus. Some effects of temperature and of virus inhibitors on infection of French-Bean leaves by Red Clover mottle virus.** – *Ann. appl. Biol.*, **48**, 4, pp. 742–748, 1 pl. (6 fig.); pp. 749–755, 1960. [18 & 11 ref.]

Studies at Univ. Ill., Urbana, and at Rothamsted on red clover mottle virus (RCMV) isolated from red clover in England have been noticed in part [**40**, 2]. The virus was inactivated in 8 days at 18° C. but survived for long periods at −20°. Sap was not infective when diluted to over 1 in 1,000. The virus was soluble and stable at pH 4–7; it was precipitated without inactivation by 50% saturated $(NH_4)_2SO_4$ solution but was inactivated by ethanol or acetone. The virus did not precipitate with antiserum prepared against lucerne mosaic virus, broad bean mottle virus, or broad bean true mosaic virus and these 3 viruses did not precipitate with antiserum to RCMV, either in tube or gel-diffusion tests [cf. **36**, 669]. The prevalence and field significance of RCMV are uncertain.

In the 2nd study French bean (*Phaseolus vulgaris*) plants kept at 36, 32, or 28° for 1–2 days were more susceptible to RCMV, though less so after longer exposures to 36 and 32°; susceptibility increased most rapidly at 36°. The number of infections remained unaffected by changes in post-inoculation temps. between 12 and 24°, but declined above 24°. Rate of multiplication increased with increase of temp. up to 28° but the max. virus concs. reached at 18, 24, and 28° were all very similar and more than the max. reached at 30°. Thiouracil only slightly reduced infection of French bean; trichothecin inhibited it much more, the presence of 200 mg./l. reducing the no. of infections by 90%. Leaves in which trichothecin affected the number of lesions were invariably damaged; both effects could be prevented by washing the leaves in water within 1 hr. (at most) of inoculation. Thiouracil and azaguanine had no effect on virus content but trichothecin greatly decreased it. Leaves floated in trichothecin were less severely damaged than when trichothecin was mixed with the inoculum; transference of the leaves to water after 2 days did not restart virus multiplication. The total number of lesions produced in the leaves floated in the different liquids were similar but they were smallest on those in trichothecin. It is considered likely that trichothecin acts by preventing further virus multiplication and not by inactivating virus already formed.

NAGARAJ (A. N.). **Hereditary variation in the ability of a leafhopper to transmit two unrelated plant viruses.**—*Diss. Abstr.*, **20**, 12, p. 4484, 1960.

Four races of *Agallia constricta*, bred selectively through 6 generations at the Univ. Ill., differed in their ability to transmit wound tumour virus [clover big vein virus: **40**, 61] and potato yellow dwarf virus. Race WY transmitted both viruses, Wy clover big vein only, wY potato yellow dwarf only, and wy neither. The 2 viruses

did not appear to interfere with the transmission of the other in host (crimson clover) or vector. The greater efficiency of WY and Wy was partly due to the persistence of clover big vein virus in the transovarial passage. Results indicated that factors affecting the efficiency of transmission of each virus were different and it is postulated that at least 2 alleles, if not 2 genes, are involved in determining efficiency. No transovarial passage of potato yellow dwarf virus was detected in any of the races of *A. constricta*. The ability of the leafhoppers to transmit potato yellow dwarf was inherited independently of the ability for transovarial passage of clover big vein virus.

Selsky (M. I.). **Factors affecting the occurrence of symptomless and virus-free plants propagated from wound-tumor Sweet Clover cuttings.**—*Diss. Abstr.*, **20**, 12, p. 4485, 1960.

When cuttings were taken from *Melilotus officinalis* plants (18–25 weeks old) infected by the vectorless (VL) str. of clover wound tumour [big vein] virus [cf. above] at the Univ. Ill., 20% of the resulting plants were virus-free. Following treatment for 6–10 and 11–17 days at 35° C. the frequency of virus-free plants was 44 and 75%, respectively; treatment at 40° was even more effective. When younger (6–9 weeks old) clover plants were employed, the frequency of virus-free plants from cuttings dropped to 2%.

In another series of experiments *M. officinalis* cuttings infected by a severe vectorial str. of clover big vein virus grown from the time of propagation at 14° for 49 days, 6% of the plants remained symptomless, but when the young VL-infected cuttings were treated the same way, 74% failed to develop tumours. No symptoms developed in control plants kept at 14° for 3 vegetative generations. In another experiment 68% of the young plant cuttings were symptomless after 2 generations at 14°.

Blodgett (E. C.) & Aichele (M. D.). **Evaluation of flowering crab and certain other Apple clones for detecting stem pitting in Apples.**—*Plant. Dis. Reptr*, **44**, 10, pp. 767–770, 2 fig., 1960.

In preliminary screening tests at Irrigation Exp. Sta., Prosser, Wash., the crab apple vars. Jay Darling, Purple Wave, Eleyi, Evelyn, Irene, Purple Lemoine, Red Silver, and Van Eseltine were the best indicators of apple stem pitting virus [**39**, 179], developing tip die-back in 43 days.

Current research, investigation and experiments. —*Orchard, N.Z.*, **33**, 9, pp. 307–308, 1960.

At the Plant Diseases Div. and Fruit Res. Div., New Zealand, melprex, in experimental use for a 2nd season, at ½ lb. 100 gal. again gave outstanding control of apple black spot [*Venturia inaequalis*: **38**, 525], but at ¼ lb. was not satisfactory. Compared with captan, melprex at ½ lb. caused slightly more fruit russet on Cox's Orange and Sturmer in Nelson, and on Golden Delicious in Hawke's Bay, but on Dunn's, Granny Smith, Dougherty, and Delicious in Nelson and on Granny Smith in Hawke's Bay the 2 were about equal.

In small scale experiments with Sturmer in Auckland a summer programme of captan+stickers gave a control of bitter rot (*Glomerella* [*cingulata*: **39**, 325]) equal to that obtained with Bordeaux mixture.

Barnes (E. H.) & Williams (E. B.). **A biochemical response of Apple tissues to fungus infection.**—*Phytopathology*, **50**, 11, pp. 844–846, 1 graph, 1960.

Most of this information, relating to *Venturia inaequalis* and *Podosphaera leucotricha*, has been noticed [**39**, 719].

JOUANNEAU (H.). **Observations sur l'intervention probable d'une bactérie phytopathogène (Pseudomonas syringae) dans la genèse de certains accidents fréquemment observés sur Pommier, notamment sur la variété 'Richared'.** [Observations on the part probably played by a phytopathogenic bacterium (*P. syringae*) in the production of certain conditions often noted on Apple, especially on the var. Richared.]—*C.R. Acad. Agric. Fr.*, **46**, 13, pp. 782–785, 1960.

In May 1959 the author isolated a str. of *P. syringae* [cf. **35**, 829 *et passim*] from an apple bough bearing 'papery' cankers which was pathogenic to bean [*Phaseolus vulgaris*]. The disease spread to 50% of the trees in the orchard (Gironde area), planted with Golden Delicious and Richared, the latter being the more severely affected.

At the end of summer 1959, near Nantes, young Richared trees adjacent to Passe-Crassane pears severely affected by *Pseudomonas syringae* had branches with very few leaves in the middle, imperfectly developed buds with superficial lesions round the leaf scar, and leaves with a brownish-yellow necrotic spotting. In June 1960 these symptoms again appeared and bark lesions resembling the 'papery' cankers were present. Isolates from affected material were all identical with those isolated from the pears.

DIMZA (I.). **Pētījumi par mikroelementu ietekmi uz Ābeļu hlorozi.** [The effect of trace elements on chlorosis of Apple trees.]—*Latv. Zinat. Pēt. Zemkop. Inst. Zinat. Rak. Krājums*, 9, pp. 221–232, 1959. [Russ., Engl. summ.]

Spraying iron-deficient trees at Pūrē exp. Sta., Latvia with 0·3–0·5% $FeSO_4$ solution reduced chlorosis, but Fe''' compounds were less effective. Ascorbinoxidase and peroxidase were less active in chlorotic than in green leaves, while polyphenoloxidase was more active in the chlorotic. Spraying with 0·4% $FeSO_4$ solution increased yield both in the year of application (1956) and in the next.

STEWART (D. K. R.) & ROSS (R. G.). **Further studies of mercury residues on Apple fruit.**—*Canad. J. Pl. Sci.*, **40**, 4, pp. 659–665, 3 graphs, 1960.

Further work at Kentville, N.S. [**39**, 720], showed that after single cover sprays of erad (10% phenyl Hg acetate) Hg residues in apples fell to a min. in early Aug. and then increased until harvest to exceed the initial deposits, presumably due to translocation from other parts of the tree. In 1 sampling apples sprayed on 17 July and sampled 8 Oct. had 50·9 μg. Hg in the peel, 64·9 in the pulp, and 2·6 in the seed (total 118·4). The most effective means of protecting fruit during and following spraying was by bagging with mylar film (more effective than polythene).

CEPONIS (M. J.) & FRIEDMAN (B. A.). **Water core in Lady variety Apples during storage.**—*Plant Dis. Reptr*, **44**, 1, pp. 29–30, 1960.

During autumn 1958 samples from a shipment of Missouri-grown Lady apples which arrived in New York with a high visible percentage of water core [**23**, 442] were stored at 35° and 70° F. for varying periods and the effect of water core on subsequent defect development determined by the agric. Marketing Service, U.S. Dept Agric., N.Y. Internal breakdown was most severe in apples over 2 in. in diam. which had visible water core on arrival. During storage and holding 5% decay developed in water-core apples while only 3·8% developed in unaffected fruit.

MÜLLER (H. J.). **Über das Vorkommen von Cryptosporiopsis corticola (Edg.) Nannf. auf der Rinde von Apfel und Birne.** [The occurrence of *Pezicula malicorticis* on the bark of Apples and Pears.]—*Phytopath. Z.*, **39**, 3, pp. 291–296, 3 fig., 1960. [Engl. summ. 24 ref.]

The occurrence of acervuli of *P. malicorticis* on the bark of pome fruits in central Germany is reported from the Phytopath. Inst. der Martin Luther Univ., Halle,

Wittenberg. The necrosis corresponds to the symptoms described in the literature as a superficial canker. All observations and experiments indicate that in central Germany infection was preceded by frost damage to the bark. The perfect state was not found. Pycnidia of a *Cytospora* sp., superficially similar to the acervuli, were found with *Pezicula* on the bark necroses of many of the 1,000 trees under observation.

Rui (D.). **Precisazioni sul mosaico del Pero.** [Notes on Pear mosaic.]—*Notiz. Malatt. Piante* 52 (N.S. 31), pp. 3–6, 2 pl., 1960. [Engl. summ.]

The symptoms of pear mosaic virus [cf. **37**, 412, *et passim*] present on Kaiser pears in Verona, Italy, in the summer of 1958 were accompanied by some peculiar modifications of the leaves: the upper surfaces bore pale to yellowish spots or larger areas, which sometimes dried; the blades were curved inwards, rolled up into a tube, or were undulated, or the base of the petiole was lyre- or V-shaped; some leaves were almost circular and some very small. The crop was unaffected.

Crosse (J. E.), Bennett (Margery), & Garrett (Constance M. E.). **Investigation of fire-blight of Pear in England.**—*Ann. appl. Biol.*, **48**, 3, pp. 541–558, 1 pl. (5 fig.), 3 diag., 1960. [47 ref.]

The only authenticated records of pear fire blight (*Erwinia amylovora*) are those in Britain [**39**, 596], U.S.A., and New Zealand. All other reported occurrences [map 2] may involve confusion with *Pseudomonas syringae*. In 1957 when the disease first occurred spring blossom was exceptionally early, beginning at the end of Mar., and the highest temp. recorded at E. Malling (on 1 day only) was 67° F. Seasonal development and symptoms on pear and other hosts are described in detail. The higher proportion of infections in 1958 on trees attacked in 1957 suggested the presence of overwintered sources of infection in these trees additional to active holdover cankers. Distribution in the orchards in 1957 and 1958 was consistent with spread by pollinating insects rather than by rain.

The outstanding susceptibility of Laxton's Superb [**39**, 650] in all localities was attributed partly to its tendency to produce copious secondary blossom.

Nichols (C. W.), Schneider (H.), O'Reilly (H. J.), Shalla (T. A.), & Griggs (W. H.). **Pear decline in California.** *Bull. Calif. Dep. Agric.*, **49**, 3, pp. 186–192, 2 col. pl. (9 fig.), 1960. [31 ref.]

During the summer 1959 all the major pear-growing areas were affected by a serious disorder resembling pear decline [**38**, 756; **40**, 201]. The symptoms appeared on all vars. Foliage of affected trees turned abnormally red in Sept. and in the following spring there were severe decline symptoms. Sometimes a brown line was apparent on the cambial face of the bark at the bud union. The results of surveys in the State and current research into the possible nature and causes of the decline elsewhere are briefly reviewed.

Pierson (C. F.). **Postharvest fungicide treatments for reduction of decay in Anjou Pears.**—*Plant Dis. Reptr*, **44**, 1, pp. 64–65, 1960.

At the Market Quality Res. Div., U.S. Dept Agric., Wenatchee, Wash. [cf. **28**, 221], [unspecified] decay in wrapped fruits in 3 seasons was controlled equally well by dips in captan (1 lb. 100 gal.), phaltan (0·12%), or 'stop-mould' (Na-*o*-phenylphenate) (0·6%)+a water rinse: av. reduction from 34·6 to 16–18%. Deyhydroacetic acid-Na salt was less effective.

Ogawa (J. M.) & Lyda (S. D.). **Effect of alcohols on spores of Sclerotinia fructicola and other Peach fruit-rotting fungi in California.** –*Phytopathology*, **50**, 11, pp. 790–792, 1960.

At Dept Plant Path., Univ. Calif., Davis, propanol (1 min. dip at 20° C.) was most

toxic, and methanol the least, to spores of *S. fructicola*, *Rhizopus stolonifer* [**40**, 56], and *Gilbertella persicaria* [**39**, 557]. The most fungicidal mixtures were propanol + ethanol or + isopropanol. Conidia of *S. fructicola* on uninjured fruit surfaces were killed in 0·08 min. by 50% ethanol and those on the flesh in 2 min., comparable figures for the other spp. being 1 min. in 60% ethanol (uninjured), as against 60 min. in 70% ethanol for *R. stolonifer* and 40 min. for *G. persicaria*, when injured. If fruits given 1 min. in 60% ethanol were rinsed in water there was no phytotoxicity and their appearance was improved.

Diseases of Peaches and Nectarines.—*Tasm. J. Agric.*, **31**, 3, pp. 334–341, 5 fig. 1960.

Most of this information has been noticed [**35**, 687; **36**, 210]. Among the less common diseases, peach scab (*Fusicladium carpophilum*) [map 198] and blackheart (*Verticillium dahliae*) have recently been recorded in Tasmania.

Daines (R. H.), Haenseler (C. M.), Brennan (E.), & Leone (I.). **Rusty spot of Peach and its control in New Jersey.**—*Plant Dis. Reptr*, **44**, 1, pp. 20–22, 3 fig., 1960.

This information has been noticed [**39**, 599]. The incidence and control of the disease and the presence of oidium-like spores on the spots suggest that it is caused by a powdery mildew.

Wilde (W. H. A.). **Insect transmission of the virus causing little Cherry disease.**—*Canad. J. Pl. Sci.*, **40**, 4, pp. 707–712, 1960. [21 ref.]

Of 24 spp. of leafhoppers tested at the Canad. Dept Agric., Summerland, B.C., *Macrosteles fascifrons* transmitted [cherry] little cherry virus [**38**, 611] in 7 tests and *Scaphytopius acutus* and *Psammotettix lividellus* in one each, from var. Lambert to Star or Sam. Usually 2–4 yr. elapsed before definite symptoms were observed in the indicators.

Vīksne (A.). **Ērkškogu selekcija** [Selection of Gooseberries.]—*Latv. Zinat. Pēt. Zemkop. Inst. Zinat. Rak. Krājums*, 9, pp. 246–259, 1959. [Russ., Engl. summ.]

Selection of gooseberry seedlings starts at the end of the 1st summer (after spring planting); the weaker seedlings are then affected by *Sphaerotheca mors-uvae* [**40**, 118]. The best new resistant hybrids, all derived from *Ribes rotundifolium*, were: No. 137 (Roaring Lion × Pellervo), 293 (Skaidrais ūdens), 111 (Varonis), 298 (Baltoga), 156 (Avenīte), 162, 164, etc.

Frazier (N. W.). **Differential transmission of nineteen variations of Strawberry mottle virus by Aphis gossypii Glover.**—*Plant Dis. Reptr*, **44**, 1, pp. 12–13, 1960.

The results are presented of transmission tests at the Dept Entomol. and Parasitol., Univ. Calif., Berkeley [cf. **39**, 725], on the transmission of 19 strawberry mottle virus variants, supporting previous evidence that the typical (transmissible) and curly-dwarf (usually non-transmissible) groups are probably distinct [**38**, 217]. There were 3 levels of transmission, one of the latter group and 5 of the former having a low rate (1–25%).

Miller (P. W.). **Rapid degeneration of some Strawberry varieties and selected seedlings infected with latent C virus in combination with other viruses.**—*Plant Dis. Reptr*, **44**, 10, pp. 796–799, 4 fig., 1960.

At Ore. agric. Exp. Sta., Corvallis, the addition of strawberry latent C virus [cf. **38**, 707; **40**, 58] to other viruses in many vars., by the leaf-petiole graft technique [**38**, 93], caused more rapid and severe degeneration than any other known

combination. In some selections symptoms appeared within 29 days, but stunting, curling, and twisting of the leaves was usually evident in 4–12 weeks. Rockhill, Puget Beauty, and U.S. Ore. selections 2528, 2592, 2678, and 2701 were somewhat tolerant of latent C, which so far has not been found in commercial strawberry stocks W. of the Rocky Mts.

MEREDITH (D. S.). **Studies on Gloeosporium musarum Cke. & Massee causing storage rots of Jamaican Bananas. II. Some factors influencing anthracnose development. III. Control with sodium salicylanilide (shirlan WS) and nystatin.**—*Ann. appl. Biol.*, **48**, 3, pp. 518–528; 4, pp. 824–836, 1 pl., 1960. [17 & 28 ref.]

Further studies at the Banana Board Res. Dept, Kingston, Jamaica, showed that the severity of anthracnose (*G. musarum*) [cf. **40**, 59], which develops after wounding, increases with the 'grade' of maturity of the green, unpicked fruit, 'full' fruit being more seriously affected than 'thin' fruit. Gros Michel appeared to be less susceptible than Lacatan or Robusta. In fruit imported into the United Kingdom [**39**, 434] anthracnose is most in evidence during the autumn and winter, the reason for which is now under investigation.

The use of perforated polythene bags in storage at 55° F. appeared to favour the development of the disease slightly, but during subsequent ripening had no significant effect on rotting. After wound-inoculation incidence and severity decreased appreciably with increasing duration of storage at 76–87°, such decrease being apparent even when the humidity at the surface of the fruit was kept at 92–100%. There is little reason to believe that an interval of 40 hr. or more between reaping and loading will increase anthracnose.

In several shipping trials conducted under ordinary commercial conditions a post-harvest fruit-dip with mycostatin 20 at 200–400 p.p.m. gave 40–70% control. There was no evidence that 400 p.p.m. was any more effective than lower concs. Subsequent experiments, however, showed that nystatin did not control Santa Marta stem-end rot caused by *G. musarum* [cf. loc. cit.; **38**, 22].

Experiments described in III demonstrated that dipping Lacatan bananas inoculated with *G. musarum* for 1 min. in 0·5, 1, and 1·5% shirlan WS gave approx. 30, 50, and 65% control of finger mark rot [**39**, 434], respectively, but all concs. were severely phytotoxic. When this treatment was succeeded by rinsing in water there was no phytotoxicity and approx. 15, 35, and 40% control resulted. Shirlan WS at 1 and 1·5% gave good control of the anthracnose symptom also, with and without post-treatment washing. Moderate to poor control of finger-stalk rot followed when shirlan WS washing was delayed for more than 24 hr. after inoculation; a 2 min. immersion was more effective than shorter periods and a momentary dip ineffective.

Nystatin [mycostatin: cf. **39**, 482] at 200 and 400 p.p.m. had no significant effect on the incidence of finger-stalk rot and failed to reduce appreciably the severity of main-stalk rot (chiefly *G. musarum*, *Fusarium* spp., and occasionally *Ceratocystis paradoxa*).

The practical aspects of using shirlan WS in Jamaica are discussed. It is considered that it would be unwise to use concs. lower than 1%, the fruit should remain in the treatment tank for at least ½ min., and should be treated as soon as possible after harvesting.

CALPOUZOS (L.), SANTIAGO (ALMA), THEIS (T.), & COLBERG (C.). **Evidence of fungistatic action of petroleum oil against Mycosphaerella musicola inside Banana leaves.**—*Phytopathology*, **50**, 11, pp. 865–866, 1960.

In further studies at the Federal Exp. Sta., U.S. Dept Agric., Mayaguez, Puerto Rico, the development of leaf spots was prevented by oil sprays [cf. above, **40**, 234] on inoculated banana leaves after penetration had been shown to occur [**38**,

534]. After 7 weeks inside an oil-treated leaf the fungus was still viable, as shown by isolations from homogenized surface-sterilized leaf tissue.

WAITE (B. H.) & STOVER (R. H.). **Studies on Fusarium wilt of Bananas. VI. Variability and the cultivar concept in Fusarium oxysporum f. cubense.**—*Canad. J. Bot.*, **38**, 6, pp. 985-994, 2 pl. (1 col.; 5 fig.). 1960. [24 ref.]

In further studies [cf. **39**, 605] several hundred isolates of *F. oxysporum* f. *cubense* from *Musa* spp. were classified into 4 morphological groups or cultivars, 'sporodochial', 'ropy', 'cottony alba', and 'slimy pionnotal', according to the growth on potato dextrose agar. 'Sporodochial' was further subdivided physiologically into 'odoratum' and 'inodoratum' [loc. cit.]. Sporodochia-producing clones were the parental types, the others arising as mutants which did not revert to the parental types. The authors propose a cataloguing system for plant pathogenic clones of *F.* spp., based on morphological and cultural characters, and give an example of the form on which the details would be recorded.

WANG (M.-C.). **Physiological studies on Gloeosporium musarum Cook et Mass., the causal organism of Banana anthracnose. I. Changes in the carbohydrate composition of Banana pulp with reference to the adaptive secretion of amylase.** —*Bot. Bull. Acad. sin.*, N.S., **1**, 1, pp. 59-75, 4 graphs, 1960. [Chin. summ.]

At the National Taiwan Univ., Taipei, Taiwan, chemical analysis of banana pulp inoculated with *G. musarum* showed an appreciable decrease in the amounts of glucose and sucrose, total sugar, and total carbohydrate, as compared with healthy tissues from the same hand. The moisture content was also somewhat greater in infected than in healthy pulp. The pH of inoculated decoctions of both mature and immature pulp became alkaline after 14 days' incubation at 28° C., by which time starch had completely disappeared. Growth on immature pulp decoction was less vigorous than on mature. *In vitro* production of the exogenous amylase (saccharifying) by the fungus was established. In a comparative study the diastatic (amylase) activity of *Botryodiplodia theobromae* was the strongest, that of *G. musarum* next, and that of *Ceratostomella* [*Ceratocystis*] *paradoxa* least.

MEREDITH (D. S.). **Control of Banana fruit-spot ('speckle') caused by Deightoniella torulosa (Syd.) Ell.** *Plant Dis. Reptr.*, **44**, 10, p. 808, 1960.

Some evidence has been obtained from banana plantations in Jamaica that the removal of dead or dying leaves, bracts, and other 'trash' results in considerable reduction of infection by *D. torulosa* [**40**, 119], particularly if the clearance is carried out before heavy rain.

COLLINS (J. L.). **The Pineapple, botany, cultivation and utilization.** —xvii—294 pp., 39 pl. (1 col.), 28 fig., 3 maps, London, Leonard Hill (Books) Ltd., 1960. 60*s*. [186 ref.]

The section of this book on cultivation contains a chapt. (pp. 187-209) on diseases, abnormalities, and pests. Accounts are given of the symptoms, etiology, and control of terminal mottle [**32**, 575], yellow spot (tomato spotted wilt virus) [**34**, 533], heart and root rot (*Phytophthora cinnamomi*) [**39**, 606], butt rot (*Thielaviopsis* [*Ceratocystis*] *paradoxa*) [**36**, 536], and *Pythium* rot [**34**, 533], all affecting the plant as a whole. Fruit affections are acetic souring ([unspecified] bacteria), glassy spoilage and fermentation ([unspecified] yeasts) [**32**, 575], fruitlet core rot or black rot or spot (*Penicillium*, *Fusarium* etc.) [**36**, 536], marbling (several spp. of bacteria) [**32**, 575], *C. paradoxa* soft rot, pink disease (an [unspecified] bacterium), and cork spot [**32**, 575]. Abnormalities may also be caused by Zn deficiency [**39**, 482], sun scald [**36**, 536], and other non-parasitic agencies and a further 7 such conditions are described.

COMELLI (A.). **Les cultures fruitières subtropicales en Israël. IV. l'Avocatier en Israël.** [Subtropical fruit cultivation in Israel. IV. The Avocado in Israel.]—*Fruits d'outre mer*, **15**, 6, pp. 261–274, 12 fig., 1960.

Under a short section on diseases and pests (pp. 271–272) it is noted that avocado pear sun blotch virus [cf. **38**, 534] is one of the few diseases of this crop in Israel; cuttings and seed should be selected from virus-free trees. *Cercospora* [*purpurea*] and scab [*Sphaceloma perseae*] are apparently unknown, and anthracnose [*Glomerella cingulata*] is rare, appearing only on fruit already damaged.

HARKNESS (R. W.). **Boron deficiency and alternate bearing in Avocados.**—*Proc. Fla hort. Soc.*, **72** (*1959*), pp. 311–317, 1960.

During a survey of Booth 8 avocado trees at the sub-trop. Exp. Sta., Homestead, from 1946–51, no visible symptoms of B deficiency were found. Trees without B applications had 15 p.p.m. in the leaves and produced an average of 57% seeds with brown, necrotic areas, while trees which had received 4 oz. borax 3 times/year had 25–50 p.p.m. B in the leaves and produced only 10% brown seeds.

In 1951 many commercial plantings of Booth avocados were affected by a previously undescribed condition in which the fruit shrivelled, leaves turned yellow and wilted, and the small feeder roots rotted. Trees that were not too far advanced in this decline recovered when the rains came. The B content of affected leaves ranged from 13–34 p.p.m. and wilted trees carried heavy crops, 25–75% of which had brown seeds. In order to maintain a B level of 50 p.p.m. each tree required ½–1 lb. borax/annum. There was an indication that biennial bearing is connected with B deficiency.

PROTA (U.). **Osservazioni e ricerche sulla 'ticchiolatura' del Nespolo del Giappone e prove di lotta eseguite in Sardegna dal 1957 al 1959.** [Observations and researches on Loquat scab and control tests conducted in Sardinia from 1957 to 1959.]—*Notiz. Malatt. Piante* 52 (N.S. 31), pp. 45–64, 1 pl., 1 graph, 1960. [Engl. summ.]

Enclosure of inflorescences in polythene bags demonstrated that infection by *Fusicladium* [*Spilocaea*] *eriobotryae* [**36**, 479, 574, and below] can take place from pre-flowering to fruit ripening, being favoured by temp. over 10° C. (opt. 22°) and rain. To protect the fruit 2–5 spray applications, or more according to the weather, are required, and should start at fruit set. The best control was given by 75% zineb (at 0·25%)+12·5% Cu oxychloride (0·3%) or +25% karathane (0·12%) plus sticker. An unnamed var. with an entire leaf margin was much less susceptible to inoculation than another with serrated margins. Fruit infection was favoured by the presence of lesions on the leaves.

SALERNO (M.). **La 'ticchiolatura' del Nespolo del Giappone (Fusicladium eriobotryae Cav.) in Sicilia. I. Appunti epidemiologici e prove comparative di lotta con anticrittogamici cuprici e acuprici.** [Loquat scab (*Spilocaea eriobotryae*) in Sicily. I. Epidemiological notes and comparative control tests with copper and non-copper fungicides.]—*Notiz. Malatt. Piante* 52 (N.S. 31), pp. 79–90, 2 pl., 3 graphs, 1960. [Engl. summ.]

In the vicinity of Giarre, Catania province in 1958–9 infection took place from Oct.–May [cf. above]. Low temp. in winter may reduce incidence. Tests with Cu oxychloride, zineb, and ziram, singly and in various combinations, Bordeaux, captan, and thiram all gave satisfactory results; 2–3 applications should be made during Nov.–15 Jan., 2–3 between 15 Mar. and 15 May, and possibly 1 in Feb.

LOPRIENO (N.) & TENERINI (I.). **Indagini sul Gloeosporium olivarum Alm., agente dalla 'lebbra' delle Olive.** [Studies on *G. olivarum*, the cause of 'leprosy' of

Olive.]—*Phytopath. Z.*, **39**, 3, pp. 262–290, 9 fig., 10 graphs, 1960. [Engl., Germ. summ. 23 ref.]

At the Società Montecatini-Instituto di Richerche Agrarie Laboratorio di Signa, Florence, conidia [**39**, 606] developed on Difco potato dextrose agar at 16–30° C. 1 day after inoculation, max. spore yield being obtained after 5 days at 21°, the min. at 16 and 30°. Max. germination was secured when conidia were washed from 4-day old cultures at 16 and 21°, or 3-day old at 26°, or 2-day old at 30°. On microscope slides high germination occurred in 16 hr. at 10–30°, with the max. above 26°. At an air temp. of 35° only 10% of the conidia germinated when washed from cultures at 26 and 30°; after 16 hr. at 35° lysis of 100% of conidia washed off at 16 and 21° occurred. Artificial light slightly depressed percentage germination. The conidia appeared indifferent to reaction of water droplets between pH 3 and 10. Dry conidia germinated (50%) in 5 hr. at 16°.

On ripe olive fruits inoculated between 10–30° infection (anthracnose symptoms) was 75–100%. Eruption occurred 6, 7, 9, and 23 days after contamination of fruit at 20, 25, 15, and 10°, respectively, but at 30° this did not occur. At 20 and 25° infection began 2 hr. after contamination, at 15° after 4 hr. Intensity of infection (percentage of fruit affected) depended on the time the fruit was kept wet. Infection and development of anthracnose did not occur on unripe fruits harvested in Aug. and Sept., but it did on those harvested in Dec. Wounds on the epicarp are necessary for infection.

Loprieno (N.) & Tenerini (I.). **Osservazioni sul ciclo biologico dell' agente patogeno dell' 'occhio di pavone' dell' Olivo (Cycloconium oleaginum Cast.).** [Observations on the life-cycle of the pathogenic agent of 'peacock's eye' of the Olive (*C. oleaginum*).]—19 pp., 14 fig., 6 graphs, 1 map, Milan, Società Montecatini, 1960. [Engl., Germ. summ. 14 ref.]

Field studies conducted near Signa, Florence in 1958–9, showed that in the conditions prevailing in Tuscany field infections of olive trees by *C. oleaginum* [**40**, 236] can occur throughout the year, save in very hot or cold periods. Most severe infections arise in autumn. The incubation period, which is 30–50 days in autumn and spring and 90–100 in summer and winter, also varies with the cultivar being longest in the resistant. If the leaves become infected in late spring or early summer atypical symptoms develop, consisting of irregular spots bearing only a few conidia.

Graniti (A.). **Presenza di Xylaria sicula Pass. et Beltr. su frutti e foglie di Olivo e considerazioni sulla specie e sulle sue forme.** [The presence of *X. sicula* on Olive fruits and leaves and considerations of the species and its forms.]—*Nuovo G. bot. ital.*, N.S., **66**, 3, pp. 364–376, 10 fig., 1959. [Engl. summ.]

In Sicily and Apulia a rot of olive fruits usually follows attack by *Dacus oleae*. The rot appears when infestation by the insect is greatest, when the fruits are growing, and when atmospheric humidity is increasing. Fruits at all stages of growth are affected and they usually fall prematurely, but may be present on the trees at harvesting. The rotted parts contain the ascospores of *X. sicula*, measuring 9·5–13×4–6 (median and modal values 11×5) μ. The fungus is often present on fallen leaves.

The slowness with which the fungus invaded the tissues of detached, inoculated green and ripe olive fruits and leaves did not allow a definite opinion to be formed as to its pathogenicity.

In cultures from fruits and leaves collected in various parts of Sicily, Sardinia, Calabria, and Apulia, the ascospores measured 9–14×4–6 μ; on leaves collected over a period of 5 yr. in Sardinia, Sicily, and Apulia, 9–15×4–7 μ. As the spore measurements of the original diagnosis (6×4) μ appear to be erroneous, an emended diagnosis is presented.

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AUTHORS' NAMES

Agarwal, 303
Agnihotri, 303
Aichele, 313
Akhromeiko, 283
Allen, 291
Angus, 275
Annaliev, 287
Anselme, 309
Atheya, 295, 303
Baba, 303
Babos, 283
Bailey, 283
Baker, 299
Balfour-Browne, 275
Barat, 302, 307
Barer, 289
Bareš, 293
Barnes, 313
Barton, 257
Bartoš, 293
Basile, 293
Batts, 296
Baudin, 307
Bawden, 290
Bayliss, 282
Bazán de Segura, 308
Belin, 292
Bel'tyukova, 280
Bennett, 315
Bental, 305
Berger, 300
Beshkov, 289
Betto, 279
Bivins, 310
Blodgett, 313
Blumer, 275
Bohus, 283
Bonaventure, 292
Boosalis, 296
Bourgeois, 309
Bredikhina, 308
Brennan, 316
Brewer, 258, 281
Brown, 278
Buchner, 274
Bulit, 285
Burrage, 296
Burrows, 298
Cadman, 262
Calpouzos, 317
Campbell, 286
Carlson, 281
Carpenter, 306
Castillo, 300
Cenóz, 294
Ceponis, 314
Chaiet, 280
Chambers, 287
Champion, 309
Chancogne, 278
Chandler, 310
Chaves, 260
Chhibber, 262
Ciferri, 277, 290
Clark, N. G., 279
Clark, R. V., 297
Clifton, 274
Cohen, 306
Colberg, 317
Collins, 318
Comelli, 319
Conkey, 281
Corbett, 310
Corte, 290
Courtney, 286
Craig, 290
Creager, 310
Crossa-Raynaud, 305
Crosse, 315
Dadant, 307
Dahl, 282
Daines, 316
Davis, D., 280
Davis, P. L., 307
Deak, 280
Delassus, 292
Dennis, 288
Deshmukh, 262
DeWolfe, 306
Dias, 262
Dimza, 314
Doling, 296
Engelbrecht, 284
Farkas, 294
Fedoseeva, 303
Feldman, 272
Fergus, 287
Firman, 307
Frazier, 316
Friedman, 314
Fukushi, 301
Garber, J. D., 280
Garber, M. J., 306
Garrett, 315
Geard, 298
Gerdemann, 297
Goldberg, 280
Goodman, 280
Gottlieb, 280
Govindu, 309
Graham, E. T., 264
Graham, J. H., 312
Graniti, 320
Grant, 304
Griggs, 315
Grindeland, 299
Grosclaude, 285
Grünzel, 263
Gubanov, 308
Guillemat, 277, 295
Gunsalus, 274
Guyot, 292
Haenseler, 316
Halisky, 309
Halmos, 280
Hamilton, 297
Hammes, 300
Hams, 279
Hannah, 297
Harding, 307
Harkness, 319
Harrison, B. D., 262
Harrison, E., 260
Heimpel, 275
Hellinger, 307
Higgons, 279
Hodges, 311
Holmes, 311
Huisman, 277
Hunter, 308
Illman, 261
Jain, 295, 303
Jermoljev, 300
Johnston, 294
Joly, 289
Jones, 304
Jouanneau, 314
Jutras, 305
Kahn, 291
Kaplan, 282
Kaufmann, 297
Kempanna, 309
Kern, 287
Khinkova, 287
Kiely, 306
Kimura, 301
King, 305
Király, 294
Klarman, 290
Klement, 275
Klotz, 306
Knorr, 304
Koch, F., 257
Koch, H., 279
Kochman, 288
Köhler, 290
Koopmans, 277
Kostić, 293
Kozhevnikova, 259
Książek, 259
Kundert, 275
Lambert, 277, 295
Larson, 291
Lawson, 274
Leijerstam, 293
Leis, 289
Leone, 316
Lhoste, 277
Lockwood, 286
Loiselle, 297
Loprieno, 319, 320
Louvet, 285
Lovisolo, 291
Lovrekovich, 275
Lukens, 290
Lyda, 315
MacKinnon, 291
Madaluni, 296
Madison, 311
Maier, 308
Markitantova, 299
Marras, 260
Martin, 309
Massenot, 292
Mastenbroek, 258
Mathur, R. S., 295, 303
Mathur, S. C., 295, 303
McEwen, 257
McFadden, A. D., 297
McFadden, L. A. 310
McKeen, 261
McNew, 275
Meredith, 317, 318
Michel, 299
Mil'ko, 264
Miller, P. R., 283
Miller, P. W., 316
Mishanec, 257
Mishustin, 285
Mokrá, 310
Moller, 260
Molot, 301
Moreira, 304
Moroniowa, 301
Morton, 297
Mostafa, 307
Mothes, 384
Mountain, 261
Müller, 314
Mulligan, 298, 311
Munnecke, 310
Murphy, 299
Nagaraj, 312
Nakamura, 278
Nakayama, 261
Nangniot, 276
Nauer, 306
Navolotskiĭ 294
Neklyudova, 262
Nelson, 259
Nemoto, 301
Newhall, 306
Newton, 312
Nichols, 315
Nicolson, 299
Noll, 257
Norman, 304
Ogawa, 315
Onufriev, 259
O'Reilly, 315
Osipyan, 288
Ostazeski, 311
Overlaet, 294
Pastushenko, 280
Patrick, 306
Petersen, 311
Peterson, 297
Phillips, 267
Pierson, 315
Pontis, 272
Pote, 280
Prasad, 303
Prévot, 281
Pridham, 284
Prota, 319
Provvidenti, 257
Purdy, 295
Pushkinskaya, 285
Pyne, 292
Raffel, 274
Ragimov, 262
Ralph, 289
Rao, 304
Rasulev, 288
Rayner, 276
Reichert, 305
Rhykerd, 312
Richardson, 282
Richmond, 278
Rodina, 283
Roger, 272
Rogers, 260
Roistacher, 306
Rosa, 267
Ross, 314
Rothrock, 280
Rui, 315
Ruokola, 300
Russell, 297
Sackston, 311
Sadanaga, 299
Sakamoto, 302
Salerno, 319
Santiago, 317
Saponaro, 296
Sato, 302
Scardavi, 277
Schein, 297
Schieber, 300, 301
Schnathorst, 309
Schneider, 304, 315
Schroeder, 257
Selsky, 313
Semangoen, 276
Shalla, 315
Shikata, 301
Sibilia, 267
Simmonds, N. W., 260
Simmonds, P. M., 296
Simons, 299
Sinha, 312
Sisler, 278
Somers, 278
Sosa, 301
Špehar, 293
Staffeldt, 308
Staněk, 300
Stanier, 274
Starr, 274
Stevenson, 279
Stewart, 314
Stover, 318
Strider, 285
Stubbs, 259
Tajima, 303
Tarr, 308
Tatarov, 289
Teakle, 288
Tenerini, 319, 320
Theis, 317
Thompson, B. D., 279
Thompson, W. L., 305
Thorpe, 293
Thresh, 292
Timian, 294
Tinline, 296
Tomlinson, 257
Truszkowska, 301
Tsao, 305
Tyner, 297
Ujević, 300
Upadhyaya, 299
Van Assche, 275
Van den Bos, 277
Van der Kerk, 276
Van Diepen, 278
Van Regenmortel, 261
Van Velsen, 262
Varma, 304
Vasudeva, 304
Venkatarayan, 259
Vetter, 257
Viksne, 316
Völker, 257
Wahlin, 267
Waite, 318
Wallis, 307
Wang, 318
Watson, M. A., 298
Watson, R. D., 286
Webb, 282
Weibel, 297
Wells, 311
Wilde, 316
Wilding, 258
Williams, 313
Willis, 291
Winstead, 285
Woltz, 310
Wood, 285
Yakimovich, 311
Yaraguntaiah, 309
Yarwood, 258
Zachos, 263
Zaumeyer, 291
Zemánek, 295

SUBJECT INDEX

GENERAL
REPORTS, Conferences, &c., Glasshouse Crops Res. Inst., Jersey, Sweden, Czechoslovak virology, Colonial Research, **264–272**; S.E. Asia Plant Prot. Committee, 273–274.
BOOKS, 274
BACTERIA, 274–275
Diseases in Argentina, 272; Madagascar, 272–273; S.E. Asia, 274.
ENTOMOGENOUS FUNGI, 275
FUNGICIDES, **275–280**
Antibiotics, 280
INDUSTRIAL, **281–282**
LEGISLATION, **282**
MISCELLANEOUS PUBLICATIONS, **283–284**
MYCORRHIZA, 283
PHYSIOLOGY, **284–285**
SOILS & FERTILIZERS, **285–286**
SYSTEMATIC MYCOLOGY (incl. Lists of Fungi), **286–289**
TECHNIQUES, 283, **289–290**, 304
VIRUSES, **267–271**, **290–291**

DISEASES AND DISORDERS OF
CACAO, 292
CEREALS, **292–303**
Wheat, 293–297
Barley, 297–298
Oats, 298–300
Rye, 300
Maize, 300–301
Rice, 301–303
Sorghum, 303
CITRUS, **304–307**
COFFEE, 307
COTTON, **307–309**
FIBRE PLANTS, **309**
FLOWERS & ORNAMENTALS, **310–311**
FODDER & HERBAGE CROPS, **312–313**
FRUIT, **313–320**
Pome fruit, 313–315
Stone fruit, 315–316
Soft fruit, 316
Banana, 317–318
Pineapple, 318
Tropical fruits, 319
Olive, 320
VEGETABLES, **257–262**
Beet & Sugar beet, 257
Legumes, 257–258
Celery, 259
Lettuce, 260
Capsicum, 260–261
Cucurbits, 261–262
Tropical vegetables, &c., 261–262
VINE, **262–264**